Measure^{IT}

Scanning Platform

SP 1200

Installation and Maintenance Manual

ABB

Produced by QCS Product Development.

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Scanning Platform SP 1200
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G	May 1996	Entire Manual		
H	September 1996	Setup Checklists, 104 Standardize Limits, 131-32	Default Compensations for IR Moisture, Microwave, and Ash Sensors, 153	
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J	July 1998	Entire Manual		
K	November 1999	Power Down and DC Power Analysis, Troubleshooting Startup Messages		
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Preface

The audience for the *Measure^{IT} Scanning Platform SP 1200 Installation and Maintenance Manual*,*3BUS 208 000 R1301*, is the person(s) who initially sets up and maintains the Scanning Platform. The purpose of this manual is to provide for installation, setup, and maintenance of the Scanning Platform.

While limited information is included, the user is expected to be somewhat familiar with operations related to the Service Workstation and Health Reports. Additional background is available in the documents listed below.

Note: If you are using the DOS/DESQview version of the Service Workstation, you need Version K of 101764-003.

The following documents are recommended for maintenance of the Scanning Platform:

* *Liquid Cooling Unit Reference Manual, 3BUS 208 146 RXX01*

* *Scanning Platform System Software Manual, 3BUS 208 [049-054] RXX01*

* *Scanning Platform Troubleshooting Procedures Manual, 3BUS 208 055 RXX01*

* *Radiation Safety Manual (for customers), 3BUS 208 089 RXX01*

* *Field Radiological Procedures Manual* (For ABB personnel only *016263-001*)

* Specific sensor manuals

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Caution and Warning Symbols

General Safety Forms and Colors

Geometric Form and Meaning

Geometric Form	Meaning
◯	Prohibition or mandatory action
△	Warning
▭ ▭	Information (including instructions)
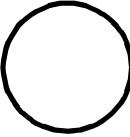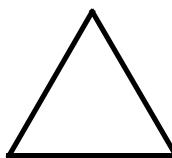
General Meaning of Safety Colors

Safety color	Meaning or Objective	Example of Use
Red	Stop Prohibition	Stop signs Emergency stops Prohibition signs
	This color is also used for fire-prevention and fire-fighting equipment and its location	
Blue[1]	Mandatory action	Obligation to wear personal protective equipment
Yellow	Caution, risk of danger	Indications of dangers, (fire, explosion, radiation, toxic hazards, etc.) Warning for steps, low passages, obstacles[2]
Green	Safe condition	Escape routes Emergency Exits Emergency showers First-aid and rescue stations

1. Blue is considered a safety color only if used in a circular shape.

2. Fluorescent orange-red may be used in place of safety yellow except on safety signs. This color is very conspicuous, especially in conditions of poor natural lighting.

Definition of Cautions and Warning Symbols

The following symbols represent warnings and cautions which you may find on the product or in product documentation.
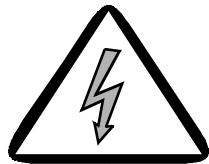
This symbol warns of dangerous voltage. This symbol is used if there is a danger of a harmful or fatal shock.

This is a radiation warning and is used when ionizing rays are present. Where a lamp is used to indicate the presence of ionizing radiation it is red.

This is a general warning symbol and is to be used if there is no other more specific symbol available.

This symbol warns of potential electrostatic sensitive devices. It is used as a reminder to observe all electrostatic discharge control procedures.

This symbol warns of a potential crushing hazard. For example, if the motor controller is not properly adjusted to stall, it may be possible for someone to be crushed between the head package and the end column.

This symbol warns of a potential hand or finger entrapment hazard.

This symbol warns that equipment may automatically start-up.

MOTOR ONLY

This symbol is a reminder that the motor must be locked off before performing any action where unexpected movement of the head package or any of the associated drive elements would pose a hazard. Note that the motor lock-out switch removes power from only the motor controller and motor. It does NOT remove all power from the SP.
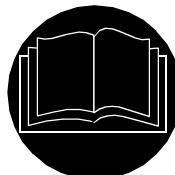
This symbol is a reminder that it is mandatory to read and understand the supporting manual before proceeding. Additional necessary information is in the manual.

⚠ WARNING

Exposed moving parts can cause severe injury.

Do not operate machine without guards in place.

Follow look out procedure before servicing machine.

See WARNING text.

4.5 TONS
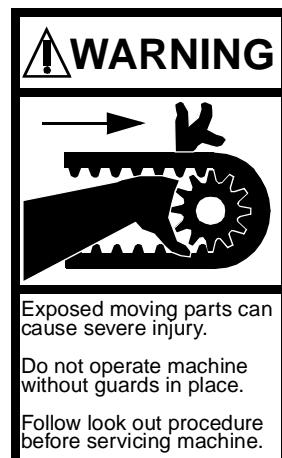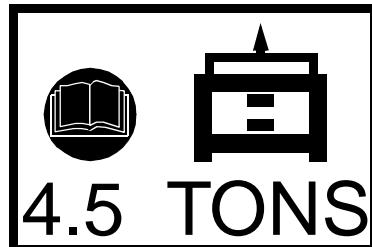
This symbol indicates the maximum weight of an SP and refers to this manual for more information. See Chapter 3, "Hardware Installation".

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1

Product Overview

The SP 1200 is a full size (maximum of 12 meters long), high-performance platform for medium-to-giant size paper machines with up to 10.2 meters (402 inches) of trim. The platform can carry up to seven sensors at a $\pm 25°$ pass angle (optionally at a $\pm 45°$ pass angle). It has on-board electronics for local sensor and platform signal processing. This chapter discusses the Scanning Platform hardware. Figure 1-1 shows a typical SP 1200 based measurement system.

This chapter contains the following major sections:

Scanning Platform

Purge Blower

Process

Water

Compressed
Air

Liquid
Cooling Unit

Sensor(s)

Power
Transformer
(240 4-wire)

Service
Workstation

Host Computer System

Figure 1-1 System Overview

SP 1200 Options

The SP 1200 can be configured with the following options listed below.

Sensor Options

The following sensors can be mounted on the SP 1200.

- Basis Weight

- Infrared Moisture

- Caliper

- Ash

- OptiPak^{TM}

- Gloss

- Temperature

- Microwave Moisture

- Edge-of-Sheet

- Smoothness

- Color

- Smart ReflectionPlus CoatWeight

Scanner Options

The following options are also available for the SP 1200.

- High temperature scanner insulation kit

- Remote electronics

- Remote control panel

- Extended end columns/extended pass angle

ABB Smart Processing Center (ASPC) Backplane Identification

Introduction

With the introduction of the Smart Color sensor and the ReflectionPlus CoatWeight sensor, it became necessary to introduce a new ASPC backplane, Part Number 086345-004. Previous updates to the ASPC backplane were all backward compatible so there is little distinction between Part Numbers 086345-001, 086345-002, or 086345-003. The latest backplane, however, is not backward compatible. It is important to be able to tell which backplane your scanner has. Associated with the new backplane are new functional drawings, sensor cables, and jumper plugs. External wiring for things like sheet break and chiller flow switches are also different. Make sure you are using the correct documentation associated with the particular version of backplane in your Scanning Platform.

Identifying Different Backplanes

The most positive identification of which backplane your system uses is to locate and read the part number tag on the PWA. The location of this tag on the 086345-004 backplane is above the programming plug, P1. Unfortunately, on some of the older backplanes it is on the bottom; sometimes concealed by the heat exchanger and plumbing.

The most obvious differences in the appearances of 086345-004 backplanes with respect to earlier versions are changes in the types of connectors (see examples of Backplanes 086345-004 and -003 in Figure 10-17 on page 218 and Figure 10-18 on page 219).

- J8, J9, and J10 are 14-position connectors. On the earlier backplanes, the connections for sheet break, reel turn-up, chiller flow switches, etc. (J8, J9, J10, J11, and J12) were all 10-position connectors.

- J11 is a new nine-position connector for wiring IR Sola transformers (replacing J20 and J21); and there is not J12, J20, or J21.

- The signal programming plugs P3, P4, and P5 were changed to 64 position from position plugs.

- The "AC IN" plug (J25) was changed to a nine-position plug from a four-position plug.

Slot Assignments

These are the typical slot assignments for Part Number 086345-004 backplane:

Slot	I.D.	Function
0	ECPSR	ECPSR
1	MPRC	MPRC
2	0x1F	ECF
3	0x21	Basis Weight
4	0x02	HemiPlus IR
5	0x03	Caliper
6	0x04	OptiPak OR Top Reflection IR
7	0x25	Dual Gloss OR Top Reflection IR
8	0x26	Ash OR Bottom Reflection IR
9	0x27	BW HAW & Microwave & Temperature & Smoothness OR Specials

These are the typical slot assignments for Backplane Part Numbers 086345-001, 086345-002, and 086345-003:

Slot	I.D.	Function
0	ECPSR	ECPSR
1	MPRC	MPRC
2	0x1F	ECF
3	0x01	Basis Weight
4	0x22	HemiPlus OR Top Reflection IR OR Bottom Reflection IR
5	0x23	Caliper
6	0x24	OptiPak
7	0x05	Dual Gloss
8	0x06	Ash
9	0x27	Color & Microwave & Temperature OR BW HAW & Microwave & Temperature & Smoothness OR Specials

Print Books

Because of the wiring and program jumper changes, there are two separate Scanning Platform print books. The print books associated with the different backplanes are:

Backplane	Print Book
086345-004	3BUS 208 006 RXX01
086345-003	3BUS 208 003 RXX01
086345-002	3BUS 208 003 RXX01
086345-001	3BUS 208 003 RXX01

$\pm$ 12 Volt Fuses

There are some very specific requirements in the National Electric Code (NEC) Article 725 having to do with cable types for power-limited circuits. To increase the selection of allowable cable types, fuses were added to the +12 Volt and -12 Volt circuits on Backplane Part Number 086345-004 for sheet break, reel turn-up, chiller flow switches, etc. They are 5 amp fuses located between J8 and J9.

Mechanical Structure

The platform beams are constructed of custom pressed, steel box beams. The cross section is shown in Figure 1-2.
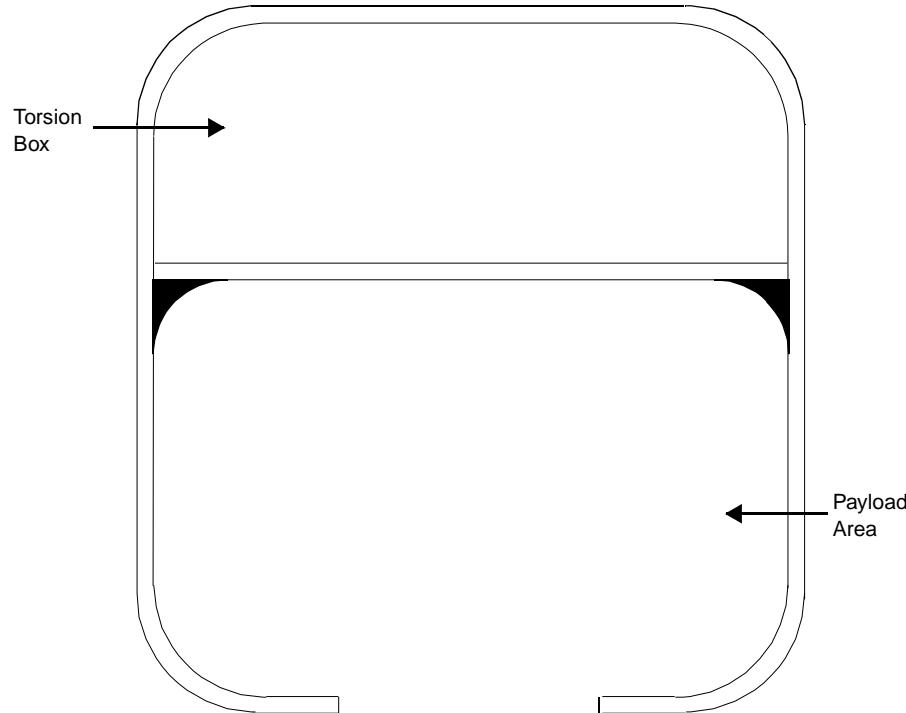
Figure 1-2 Platform Cross Section

The end columns are also made of steel box sections. The Scanning Platform is welded together in a rigid ''O''. The end columns house on-platform electronics and a drive system.

For longitudinal expansion, there is a Teflon® glide pad mounted under one end column. The other end column is fixed.

Way System

The upper and lower sensors are carried across the web by means of a two-way system with four wheels on each carriage. The principle of operation is shown in Figure 1-3.

NOTE: The encoder and drive shaft have been removed for clarity.
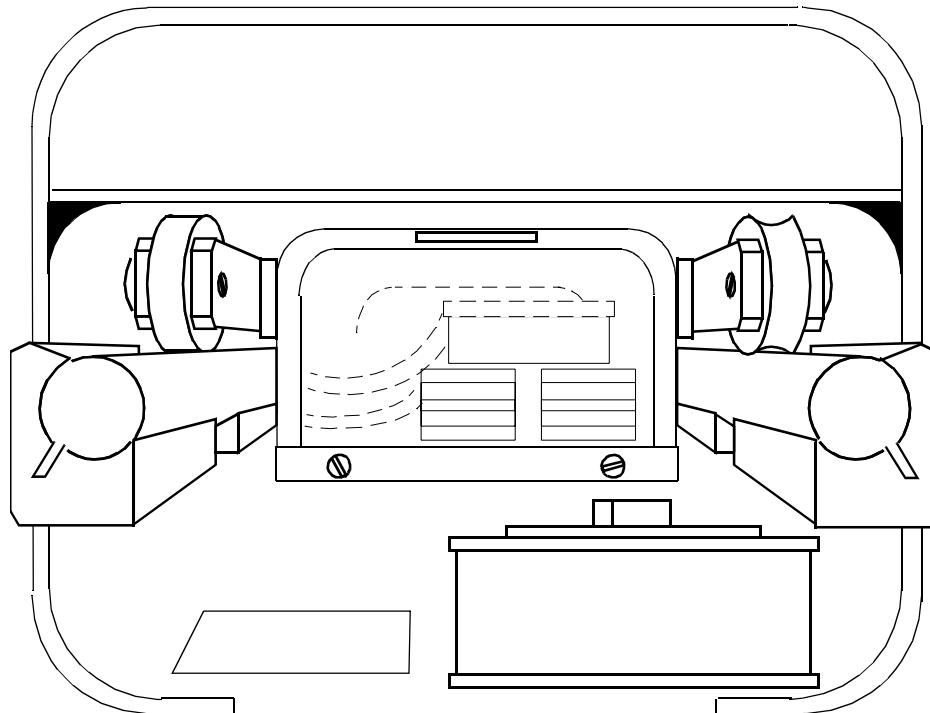
Figure 1-3 Carriage System

The weight of the carriage is carried on the side way bars which provide precision of motion. The horizontal guidance is provided by contoured wheels.

The carriage wheels are made from a hard, carbon fiber and Teflon reinforced polymer. The bearings are permanently lubricated ball bearings.

The way bars are permanently laser aligned at the factory and locked by high strength fasteners. The side way mounting bolts are covered by self-locking plastic push buttons.

Note: The way bar alignment is never to be adjusted in the field.

Drive System

The upper and lower carriages are traversed across the web by the drive system. The principle of operation is shown in Figure 1-4.
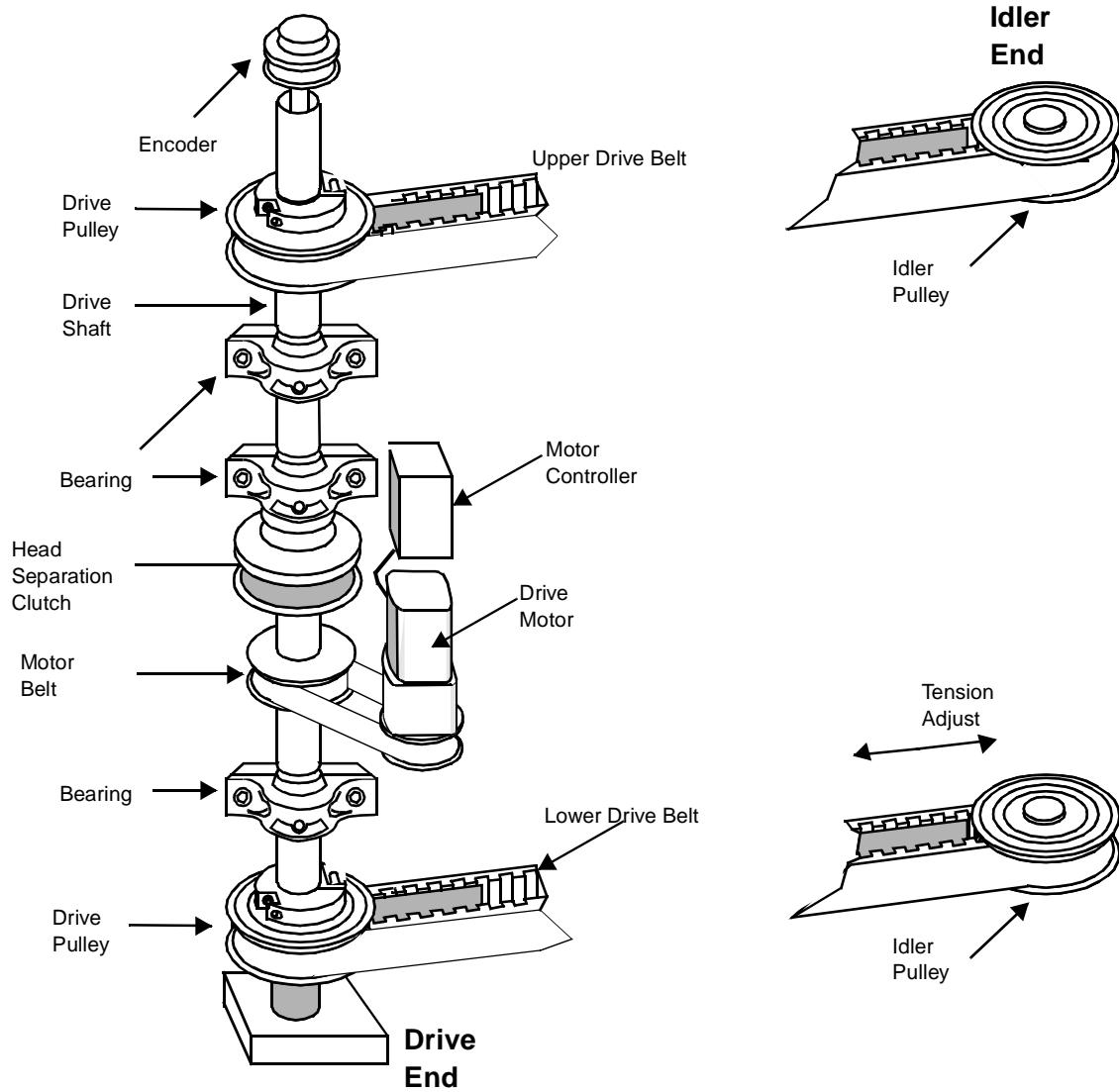
Figure 1-4 Drive System

The drive motor is a three-phase, variable frequency AC gear motor. The motor controller supplies the drive wave forms. The drive belts are 2 inch (50 mm) wide and made of steel-reinforced polyurethane.

A pneumatic, self-aligning head separation clutch at the middle of the drive shaft allows for head separation.

The encoder gives a positioning pulse train consisting of A and B quadradture pulses and an index pulse. The software counts pulses to establish the head position. A home limit switch is used to reset the counters and establish position reference.

Electrical and Cable Systems

The major electrical components and their locations are shown in Figure 1-5. The
electrical component descriptions are given in Table 1-1.
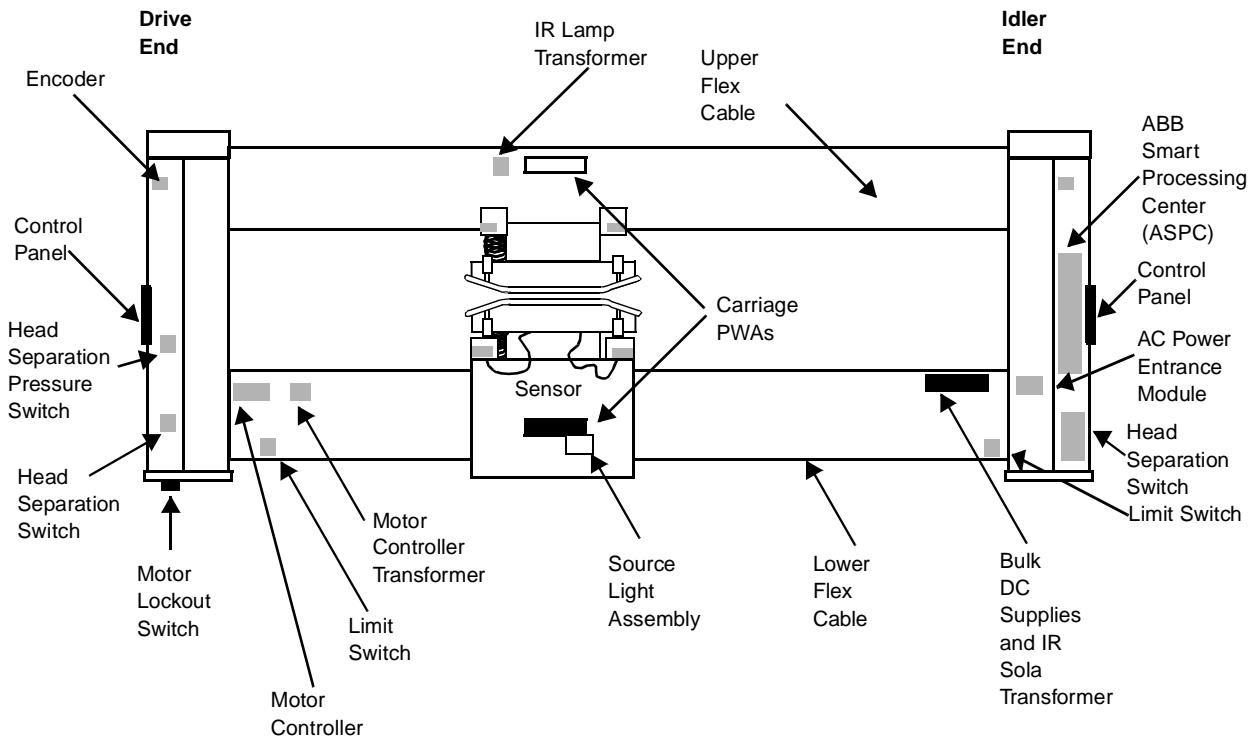
Figure 1-5 Electrical Component Locations

Table 1-1 Electrical Components

Item	Description
AC Power Entrance Module	Contains circuit breakers, filters, and the outlet and termination for incoming AC power
Bulk DC Supplies	Delivers bulk DC voltages for the ABB Smart Processing Center, sensors, and accessories
ABB Smart Processing Center (ASPC)	Contains all of the smart electronic modules for platform and sensor processing, connector systems for most of the cables, and an environmental control system
Control Panels	Allows for operation of the platform and display status via LEDs
Limit Switch	Used to stop head travel and to reset the encoder counter
Encoder	Located on the drive shaft; gives head position feedback to the system
Motor Controller	Delivers three-phase power to the drive motor; incoming AC power is isolated via the motor controller transformer
Head Separation Pressure Switch	Located at the drive clutch assembly; it senses the head separation to take safety action during head split
Head Separation Switch	Located on both end columns to activate head separation clutch
Motor Lockout Switch	Allows for positive lockout of power to the drive motor for safety during maintenance operations
IR Sola Transformer	Delivers stabilized AC power to the IR source head and lamp transformer
IR Lamp Transformer	Provides for lamp power at the carriage
Carriage Connector Boards	Distribute the power and signal functions from the flex cables to the sensors
Flex Cables	With signal ribbon cable, power ribbon cable and flex hoses connect moving carriages to end column
Sensor Cables	Connect sensors to carriage connector boards

Service Workstation

The Service Workstation is used for the local interaction with the ABB Smart Processing Center (ASPC). There are two versions of the Service Workstation. The older version can be any 386 or compatible PC or lap top computer with the proper software load. For software setup information see the appropriate *Measure^{IT} Scanning Platform System Software Manual, 3BUS 208 [049-054] RXX01*. It is possible that an ABB MasterAid 220 can serve as a workstation for both the 1190 system and the Scanning Platform.

The newer version of the Service Workstation needs a more powerful PC. For the detailed hardware requirements and the instructions for loading the software consult the *Scanning Platform Service Workstation Getting Started Manual* (either *3BUS 208 045 RXX01* for an NT operating system or *3BUS 208 046 RXX01* for a Windows 2000 operating system).

Communications via a serial port on the ASPC must be used for the older version and can be used by the newer version. The connection can use RS232 for shorter distances or a 20MA current loop for remote use. An Ethernet connection can be used with the newer version workstation.

The Service Workstation provides the capability to interface with various utilities that are used for monitoring, tuning, and diagnostics of the electronics and the sensors on the platform.

Service Tools

Service tools include:

- A belt tension gauge is used to set the tension in the drive belts.

- A gap setting tool is used to verify the alignment of the upper and lower heads.

- A test panel is used to access platform and sensor signals at diagnostic outlets.

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2

Radiological Safety

This chapter is about radiological safety and the Scanning Platform. The information in this chapter is meant to be an overview and not a substitute for training and authorization.

This chapter contains the following major sections:

Safety Features

The radioactive material used in the nucleonic sensors is hermetically sealed in a high integrity metal capsule to form a sealed source. Each sealed source is manufactured to exacting specifications and is subjected to rigorous quality control procedures.

The sealed source in the nucleonic sensor and the X–ray tube in the X–ray sensor are shielded because they are encased in metallic source holders and are equipped with spring–loaded, fail–safe shutter mechanisms. The shutters are designed to remain closed except during operation. During operation, the system applies power to overcome the spring of the shutter mechanisms. The shutters close automatically if power to the Scanning Platform is turned off or interrupted.

When power is applied, the status of the shutters (open or closed) is indicated by the red and green shutter lights on the Scanning Platform. A red light means one or more shutters are open and there may be a radiation beam in the measuring gap. A green light, at the control panel on the end column, means all the shutters are fully closed. Refer to Figure 2-1 on page 17 for a representation of the combined shutter and status lights on the end column. The shutter status lights for each individual shutter mechanism are located on the lower head carriage. Refer to Figure 2-1 for the locations of the shutter status lights. The Ash High–Voltage status light (yellow) indicates that the X–ray tube is energized when the light is illuminated.
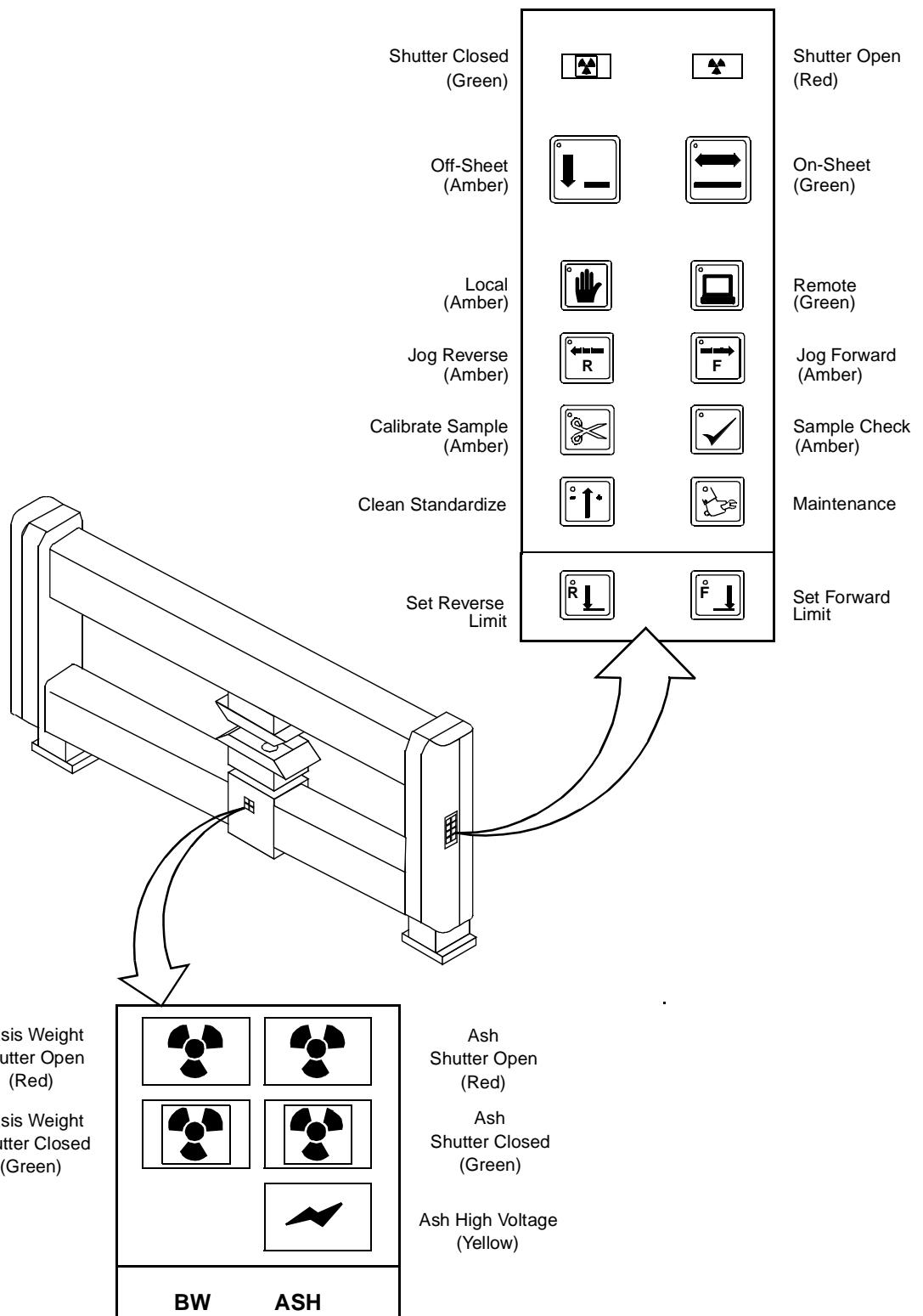
Figure 2-1 Shutter Status Lights on Lower Carriage and End Column

Handling the Source

Only persons specifically trained in radiological safety and specifically authorized by their controlling, regulatory agency may handle, install, or service the radiation source, the radiation source containment, or the radiation source shielding.

Nuclear sources for the sensors are shipped to the site in a separate container which is clearly marked with the International Radioactive Hazardous Materials shipping label and marking statement. Refer to Figure 2-2 for a description of the labeling and markings.

Upon receipt, the shipping container is to be placed in secure storage by an authorized person, who is on–site and responsible for radiological safety.

The nuclear source is to remain unopened and in secure storage until a trained and authorized person removes it for installation into the sensor.
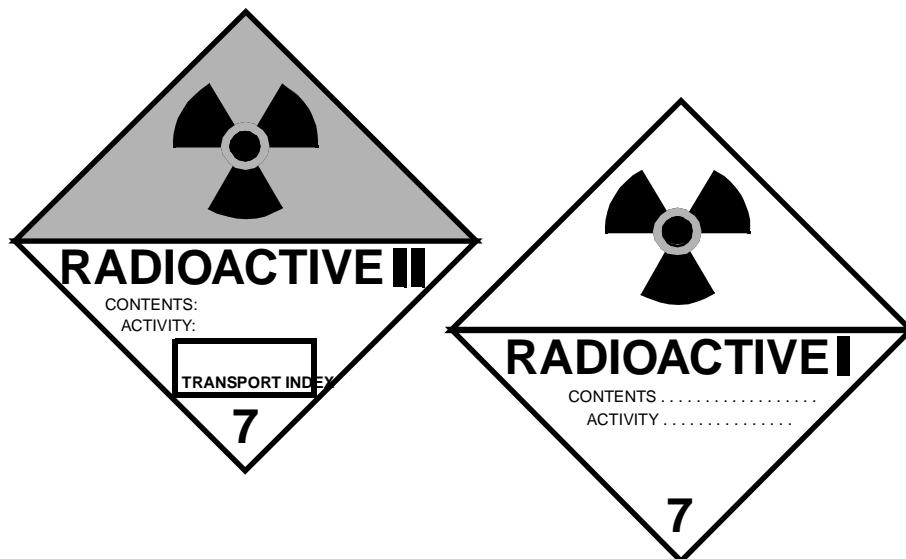
RADIOACTIVE MATERIAL, N.O.S.
UN 2982, USA DOT 7A TYPE A

RADIOACTIVE MATERIAL,
SPECIAL FORM, N.O.S.,
UN 2974, USA DOT 7A TYPE A

Figure 2-2 Types of Safety Labels Used on Shipping Containers

Installation of the Source

Installation of the radiation source may take place only after power has been turned on to the Scanning Platform and operation of all the radiological safety features has been verified.

Only persons specifically trained in radiological safety and specifically authorized by their controlling regulatory agency may handle, install, or service the radiation source, the radiation source containment, or the radiation source shielding.

Individual Responsibility

All personnel are responsible for adhering to the radiological safety cautions and procedures indicated on the labels and in the manuals that are part of the AccuRay® 1190™ Paper Machine Measurement and Control System. Refer to Figure 2-3 and Figure 2-4 on page 21 for examples of the safety labels.

REGULATORY CONDITIONS
THE RECEIPT, POSSESSION, USE, AND TRANSFER OF THIS DEVICE ARE SUBJECT TO A GENERAL LICENSE OR THE EQUIVALENT AND THE REGULATIONS OF THE U.S. NRC OR A STATE WITH WHICH THE NRC HAS ENTERED INTO AN AGREEMENT FOR THE EXERCISE OF REGULATORY AUTHORITY.
ABANDONMENT OR DISPOSAL PROHIBITED UNLESS TRANSFERRED TO PERSONS SPECIFICALLY LICENSED BY NRC OR AN AGREEMENT STATE.
OPERATION PROHIBITED IF THERE IS INDICATION OF FAILURE OF, OR DAMAGE TO, CONTAINMENT OF RADIOACTIVE MATERIAL.
INSTALLATION, DISMANTLING, RELOCATION, REPAIR OR TESTING SHALL BE PERFORMED BY PERSONS SPECIFICALLY LICENSED BY NRC OR AN AGREEMENT STATE
DEVICE SHALL BE TESTED FOR LEAKAGE OF RADIOACTIVE MATERIAL AND PROPER FUNCTIONING OF THE ON–OFF MECHANISM AND INDICATOR, IF ANY, AT INTERVALS SPECIFIED ON THE ATTACHED YELLOW LABEL.
35715 **REMOVAL OF THIS LABEL IS PROHIBITED**

CAUTION
RADIOACTIVE   MATERIAL

MODEL_____

_____

DATE MEAS._____

TEST INTERVAL_____

REMOVAL OF THIS LABEL PROHIBITED

DO NOT CONTINUOUSLY OCCUPY THE AREA WITHIN   OF THIS DEVICE

Figure 2-3 Safety Labels

CAUTION
RADIATION WHEN ENERGIZED

MODEL_____

VOLTAGE_____

CURRENT_____

_____

REMOVAL OF THIS LABEL PROHIBITED
DO NOT CONTINUALLY OCCUPY THE
AREA WITHIN   OF THIS DEVICE
WHEN ENERGIZED.

Figure 2-4 Safety Label for the X–ray Sensor

Individual responsibility also includes the following precautions:

• Pre–planning work activities to keep radiation exposure to a minimum.

• Determining that the sensor shutters are closed by looking at the status lights before beginning work near the sensor carriage.

CAUTION
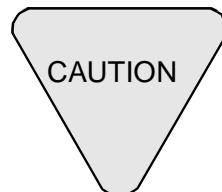
Never put any part of the human body in the sensor measuring gap when the shutter is open. Refer to Figure 2-5 on page 22.

Sensor Measurement Beam
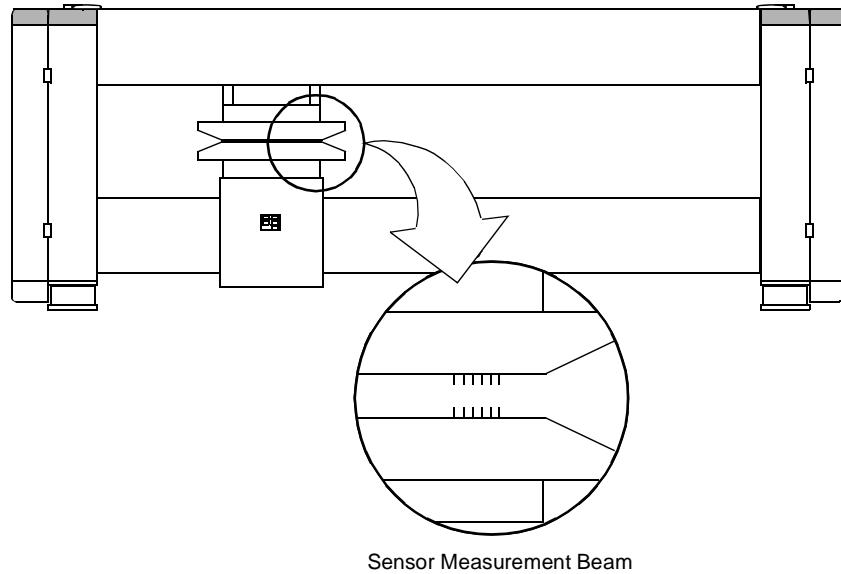
Figure 2-5 Measurement Beam

- Maintaining the safety labels and safety features.

- Not using a sensor until the safety features are functioning properly.

3

Hardware Installation

Hardware Installation guides you from the arrival of the Scanning Platform on-site to alignment of the head package assembly.

This chapter contains the following major sections:

Unpacking Instructions

The Scanning Platform is carefully packed for shipment. The platform arrives on dollies so that you are able to move it directly into position in the mill. See Figure 3-1. Depending on the location of the mill, some Smart Platforms will arrive with the dollies bolted to a skid. For those shipments, unpacking instructions are posted inside the crate.
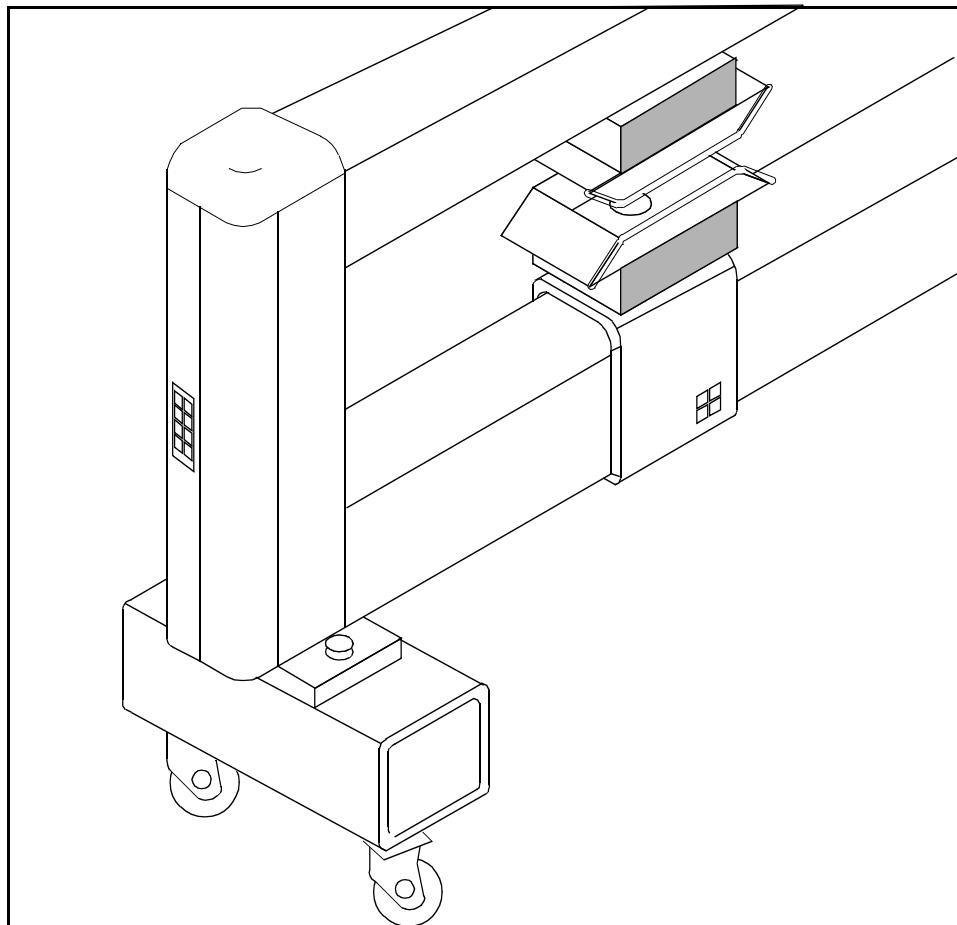
Figure 3-1 Scanning Platform on Shipping Dollies

Various components and cables are removed and packed separately for shipment. The Scanning Platform comes with a bill of lading. Use the checklist below during the unpacking process.

Checklist

❑ Inspect the platform and components for dents, scratches, and damaged parts.

❑ Verify that the delivered components match the bill of lading.

❑ If there is minor damage, make a note of the damage on the bill of lading. Photograph the damage, when possible.

❑ If there is major damage, immediately notify the ABB shipping department in Columbus, Ohio or Dundalk, Ireland.

Handling Instructions

The Scanning Platform arrives on dollies so that it can be maneuvered into place at the mill. Use caution when rolling the platform on an uneven floor to keep from getting the wheels stuck in a hole. If you need to lift the platform, see Figure 3-2 and make certain that you observe the following guidelines:

- Attach any rigging used to the two lifting eyes on top of the platform.

- Lifting forces must be spread over 75% of the platform.

- Do not lift from one point.

- Use a crane or hoist to move the platform (a dual pulley house crane is preferred to prevent weight distribution problems).

- Make certain that the platform is not subjected to bending and twisting forces.

- Do not bump or drop the platform.

- Secure the platform from movement while it is being stored.

Best

Dual Pulley House Crane

Good

Spreader Bar

Possible

Minimum 30°

Unacceptable
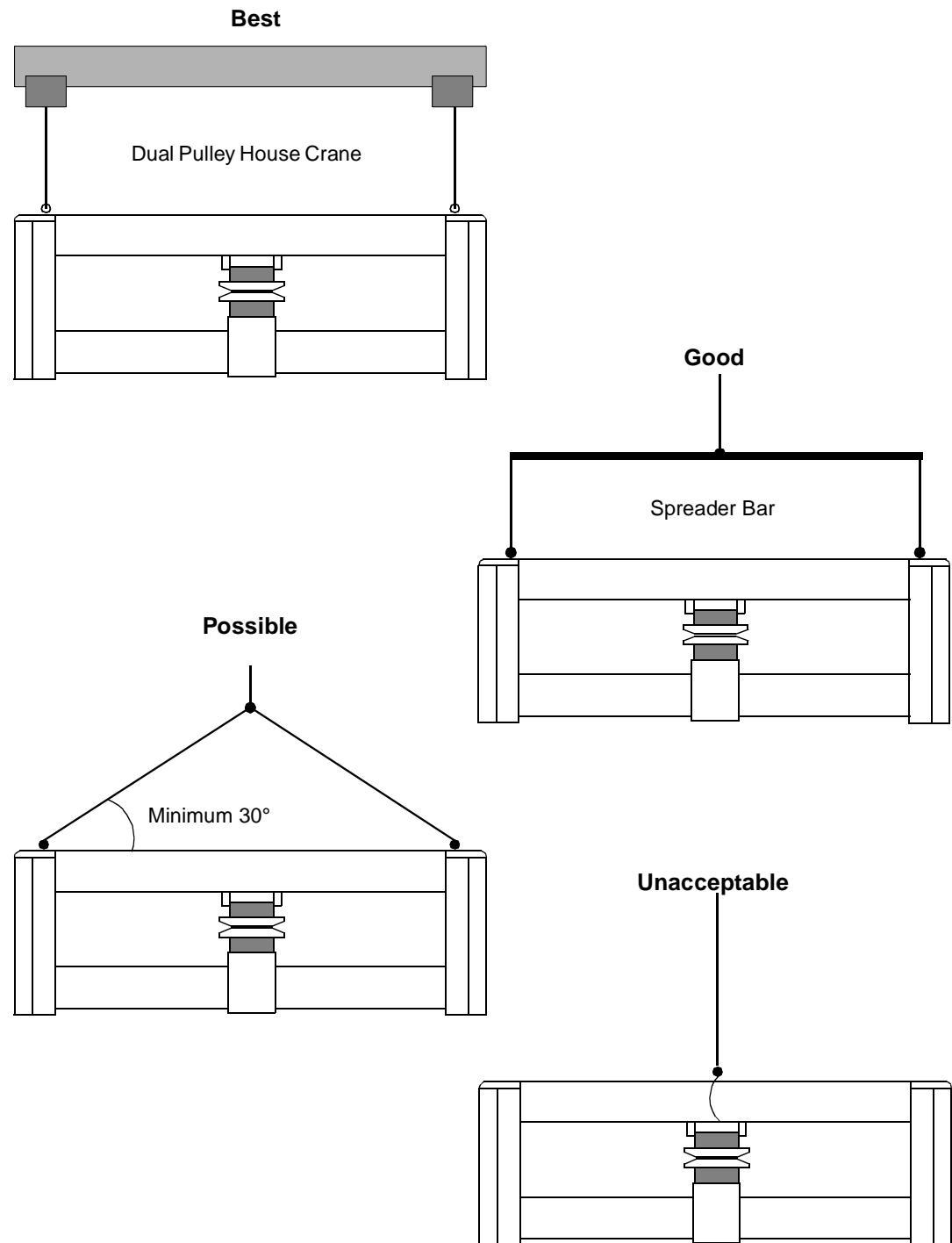
Figure 3-2 Rigging Recommendations

Dimensions and Weight

The Scanning Platform is supplied in standard lengths between the pedestal center lines as indicated in Table 3-1. Weights include sensors and dollies.

Table 3-1 Dimensions and Weight

Dash Number	Standard Length for Hole Centers		Maximum Trim		Weight	
	mm	in.	mm	in.	kg	lb.
004	4000	157.5	2235	97.9	1659	3661
005	5000	196.9	3235	127.4	1925	4248
006	6000	236.2	4235	166.7	2191	4710
007	7000	275.6	5235	206.1	2457	5243
008	8000	315.0	6235	245.5	2723	6011
009	9000	354.3	7235	284.8	2989	6597
010	10000	393.7	8235	324.2	3255	7184
011	11000	433.1	9235	363.6	3521	7773
012	12000	472.4	10235	403.0	4787	8358

Space Requirements

Installation requirements are dependent upon the facilities and space available at the site location. Refer to the general installation plans made prior to installation of the Scanning Platform.

The customer-supplied platform supports must be flat and unobstructed. Allow sufficient access space around the support for cables to be connected and disconnected.

It is advisable to drill necessary cable holes through the concrete floor before the pedestals are mounted. A single hole of approximately 3 in. (75 mm) in diameter and located near the idler end is sufficient. A similar hole can be used for the liquid cooling unit. See Figure 3-3 on page 33.

Safety

The Scanning Platform has been designed to comply with ABB and worldwide standards including the following:

- *ABB PA Electrical Safety Directive, 3BDU000002*

- *ABB PA Machinery Requirements and Policy, 3BUS000159*

- *ABB PA Field Installation Considerations for Design of Electronics, 3BSE000161*

- *ABB PA EMC Requirements and Policy, 3BSE000200*

The following personnel and machine safety rules should be followed when installing and operating the Scanning Platform.

Personnel
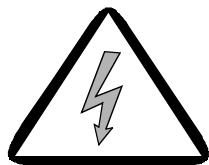
Symbols appearing on the equipment warn personnel of potential hazards. Symbols for dangerous voltage warning, radiation warning, crushing hazard warning, hand entrapment hazard warning, moving machinery warning, and a warning that equipment may automatically start up are shown on the left. Refer to the explanations in the Caution and Warning Symbols section at the beginning of this manual.

All people working on the Scanning Platform system must
know the location of the main power supply
switch to the system and how to operate it.

Service on the SP system is to be performed only by qualified, trained personnel. Hazardous voltages exist inside the ABB Smart Processing Center (ASPC) and in the SP beam.

Work with care when supply voltage is applied in the SP system. The voltage in the ASPC and the SP beam can cause injury and can even be fatal.

Machine

Avoid discharges of static electricity by grounding both yourself and tools before handling circuit boards and other parts of the equipment.

Use the grounded wristband installed in the cubicle when handling parts of the system.
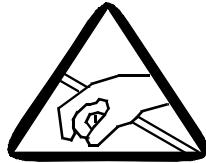
Always store circuit boards in approved anti-static bags when not installed in the system rack.

Always switch off the voltage before extracting or inserting a board.

Switch off voltage to the system and withdraw all boards at least 2 cm before electrical welding is performed near the Scanning Platform.

Installation Requirements

Environmental Data

Table 3-2 lists some of the standard parts of the Scanning Platform system and the maximum ambient temperatures in which they were designed to be used.

Table 3-2 Environmental Data for the Scanning Platform

Part	°F	°C	Rel. Hum.
SP	175	80	95% non-condensing
Remote ASPC Junction Box (Optional)	120	50	90% non-condensing
SPDC	140	60	95% non-condensing
Purge Blower	140	60	80% non-condensing
Liquid Cooling Unit (LCU)	110	43	95% non-condensing

If the temperature around the idler end column is above 50 °C, then the ASPC severe environment option which moves the ASPC into a Remote Junction Box enclosure is required.

Electrical Supply and Grounding Requirements

Supply

The signal-processing electronics in the Scanning Platform is chassis-grounded and all suppression of external signal noise uses the chassis as a reference ground. If this requirement is not satisfied, the Scanning Platform system may be sensitive to high frequency interference from unsuppressed relays, contactors, and the discharge of static electricity.

The main power supply to the Scanning Platform must be from the same power supply as the host system. If there must be a deviation, then the two supplies must be bonded to the same ground (single point earth reference).

Grounding

- The electrical connections of the reference ground are to be effective and permanent.

- The cable shields are to be connected to the chassis with a short lead of less than 10 cm (0.5 inch).

- The introduction of an extra grounding system such as an instrument ground is absolutely forbidden. The system is to be grounded with a copper lead to the distribution box (single point earth reference).

Scanning Platform Power Distribution Center (SPDC)

The main power supply to the Scanning Platform must be from the same power supply as the host system. If there must be a deviation, then the two supplies must be bonded to the same ground (single point earth reference).

A neutral to ground bond must exist on the secondary side of the Scanning Platform Distribution Center (SPDC). This bond must be only in the SPDC.

The SPDC is 10KVA and can handle the largest Scanning Platform system including the purge blower and Liquid Cooling Unit. Even if your installation does not consume that much power, the input wiring, fusing, and disconnect should still be sized for the full 10 KVA.

Allowable input voltages to the transformer are:

- Rated Input Voltage: 240, 230, 220, 208, or 200 volts ± 10%

- Rated Frequency: 50 or 60 Hertz (Hz) ± 1%

- Rated Current: 41.7 amps @ 240 VAC

The secondary is always wired as 120/240 volts alternating current (VAC).

Cabling

The *National Fire Protection Association (NFPA), Publication No. 70* "The National Electric Code (NEC)", Article 725 states that Class 1, Class 2, and Class 3 Remote-control, signaling, and power-limited circuits acknowledges alternative requirements for circuits characterized by usage and electrical power limitation. It specifies less stringent requirements than those for general wiring elsewhere in the code.

The Scanning Platform utilizes ± 12 volts with adequate isolation to be safe without further protective measures, even in wet environments. However, due to the amperage available, it does not qualify as power-limited. Any of the circuits with direct ties to the ± 12 volt power supplies qualify as "Class 1 Remote-Control and Signaling Circuits" as defined by NEC Article 725-11b and as such, require insulation suitable for 600 volts.

The serial communications circuits satisfy the "inherently limited" clause in Article 725-31 and may be wired using the Class 2 (or Class 3) rules. The cables provided by ABB for these circuits are dual rated CL3/PLTC with 300 volt insulation.

NEC Article 725-52a(2) prohibits conductors of Class 2 or Class 3 circuits from being "placed in any cable, cable tray, compartment, enclosure, outlet box, raceway, or similar fitting with conductors of electric light, power, Class 1, and non power-limited fire protective signaling circuits", except where conductors of the different circuits are separated by a barrier.

Cable requirements are as follows:

Cable Use	Cable Type	Max. Run
Comm Link from ASPC to Host (customer supplied black box required)	20mA	1000 ft.
Comm Link from ASPC to SWS	RS232 / 20 mA	15 ft./1000 ft.
Operator Panel to ASPC	connectorized	75 ft. (standard length)

Equipment Location

The location of the ASPC, the SPDC, the operator panel, and the blower will be site specific. Refer to the System Specifications prepared prior to your installation for details on where each component will be installed.

ASPC Location

The ASPC is designed to be securely mounted to the wall in the paper mill facility. Refer to *Drawing DC-D-130181-001* for details on the weight and hole pattern required for mounting the ASPC. For information on termination, refer to the appropriate wire list.

A connection terminal block for the supply voltages is located behind the cover over the main circuit breakers. The phase conductors of the main 120/240 VAC terminate directly to the main breaker; neutral and ground to the adjacent terminals.
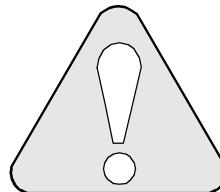
The European service power and the system 120/240 must be bonded to the same ground.

Scanning Platform Power Distribution Center (SPDC)

The Scanning Platform Power Distribution Center (SPDC) is designed to be securely mounted to the wall in the paper mill facility.

Operator Control Panel Location

Refer to *Drawing DC-D-121599-001* for information on the location and mounting requirements for the operator panel.

Blower Location

Refer to your blower specific drawings for information on its location and mounting requirements.

Liquid Cooling Unit Setup

Setup procedures for the liquid cooling unit are available in the *Liquid Cooling Unit Reference Manual, 3BUS 208 146 RXX01*.
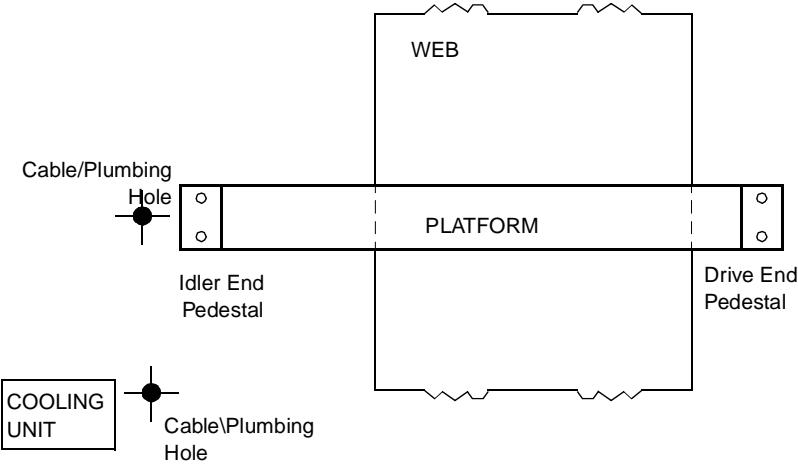
Figure 3-3 Liquid Cooling Unit Setup

Pedestal Installation and Alignment

The ultimate objective of the pedestal installation and alignment procedure is to ensure a precise dimensional relationship between the source heads, the detector heads, and the process. This objective can be achieved by following the guidelines and procedures in this section.

Installation Guidelines

Observe the following guidelines when installing the Scanning Platform.

- The pedestals must be stable in the machine direction and cross-machine direction.

- The pedestals must be level in the machine and cross-machine direction.

- The pedestal center lines must be perpendicular to the machine direction and to the sole plate.

- The top surfaces of the pedestals must be in the same horizontal plane.

- The top surfaces of the pedestals must be at the prescribed distance from the sheet pass line through the center of the Scanning Platform.

- The height of the Scanning Platform and the angle of the sensor heads may have to be adjusted to compensate for the process angle.

Alignment of the Customer Pedestals

Refer to Figure 3-4 while aligning the pedestals.
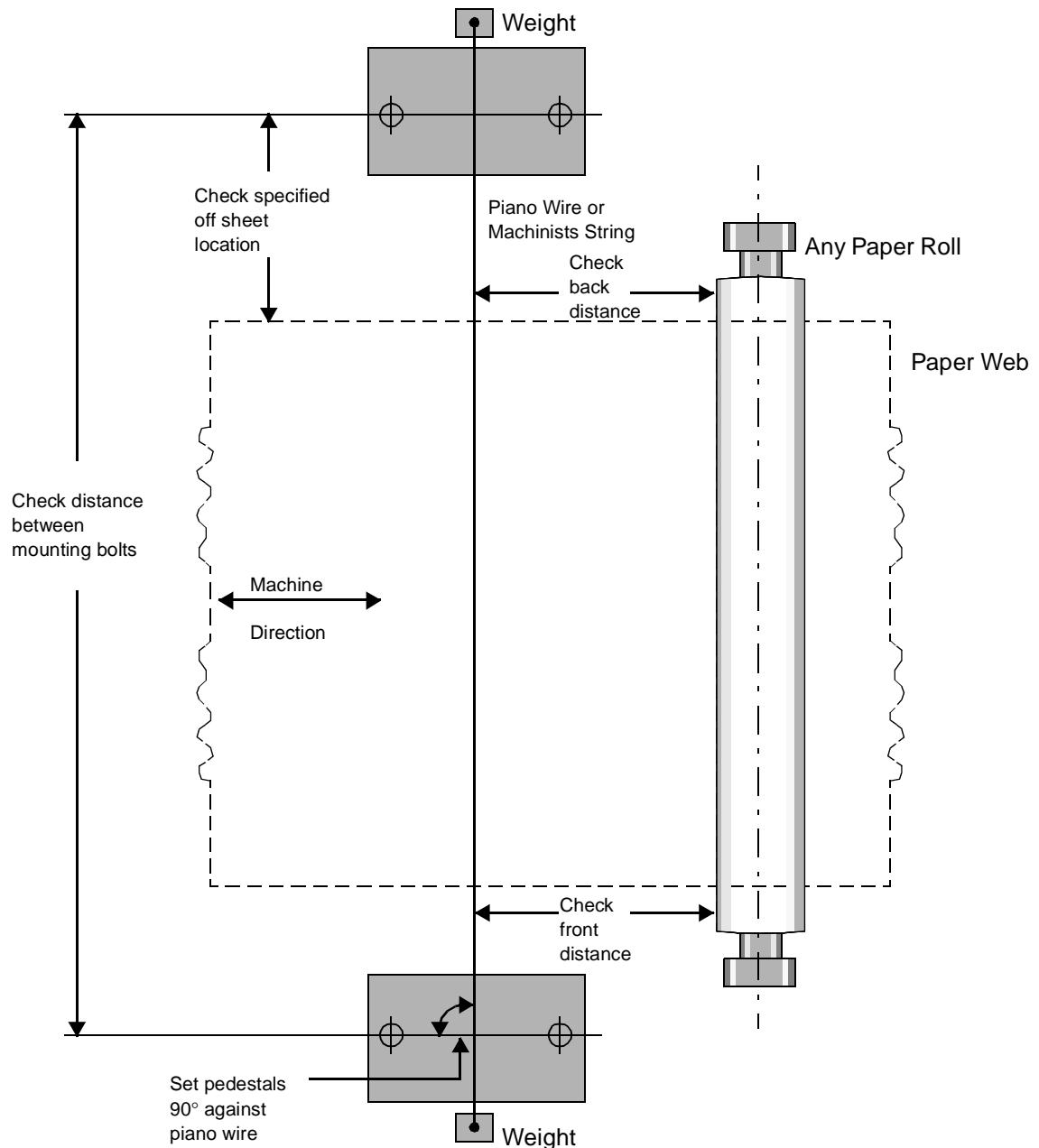
Figure 3-4 Alignment of the Mounting Pedestals

1. Scribe a center line on each pedestal exactly halfway between the mounting bolt pattern and perpendicular to the machine direction.

2. Stretch a length of piano wire (or thin, strong, machinist's string) 0.012 in (0.3 mm) in diameter between the two mounting pedestals.

3. Attach a weight to each end of the wire (approximately 10 lb./5 kg). The wire should pass over the scribe lines on the pedestal's top surface.

4. Adjust both mounting pedestals by gently tapping their sides with a hammer until the piano wire passes directly over the scribe lines for both pedestals.

5. Visually determine that the wire and the scribe lines coincide within 0.04 in. along an 8 in. length (1 mm along a 200 mm length) on each pedestal.

6. Make certain the distance between the pedestals and off sheet location (center line to center line) corresponds to the dimensions on the site specific engineering drawings.

7. Determine that the top surfaces of the two pedestals are at the same elevation.

   If the pedestals must be leveled, then recheck the alignment of the scribe lines after completing the leveling.

8. Determine that the piano wire is parallel to the adjacent process rolls within 0.08 in. (2 mm) by measuring the back and front distances of the roll to the piano wire with vertical plumb lines.

   The mounting pedestals are now aligned.

Attaching the Platform to the Pedestals

This section describes the attachment of the Scanning Platform to the pedestals.

1. Transport the Scanning Platform on its shipping dollies or skids to the installation site.

2. Remove the end column doors to avoid damaging them during placement.

3. Coat the entire top surface of both pedestals with a corrosion preventive compound.

4. Install shims. Refer to Figure 3-5 and Figure 3-6 on page 38.

   Install the 0.5 in. (13 mm) plate at the drive end. Install the 0.375 in. (10 mm) plate and the 0.25 in. (6 mm) Teflon® pad at the idler end.

Drive Side

Slot to allow for aligning platform parallel to process rolls, and calender.

Base 25 mm (1.0 in.) thick

If tapped 1.25 in. holes are used in the pedestals instead of through holes for mounting the platform, drill and tap 3/8 x 16 or M10 x 1.5 through to tapped hole for set screw to lock mounting bolt.

Steel mounting plate 13 mm (0.50 in.) thick. Seating for screws
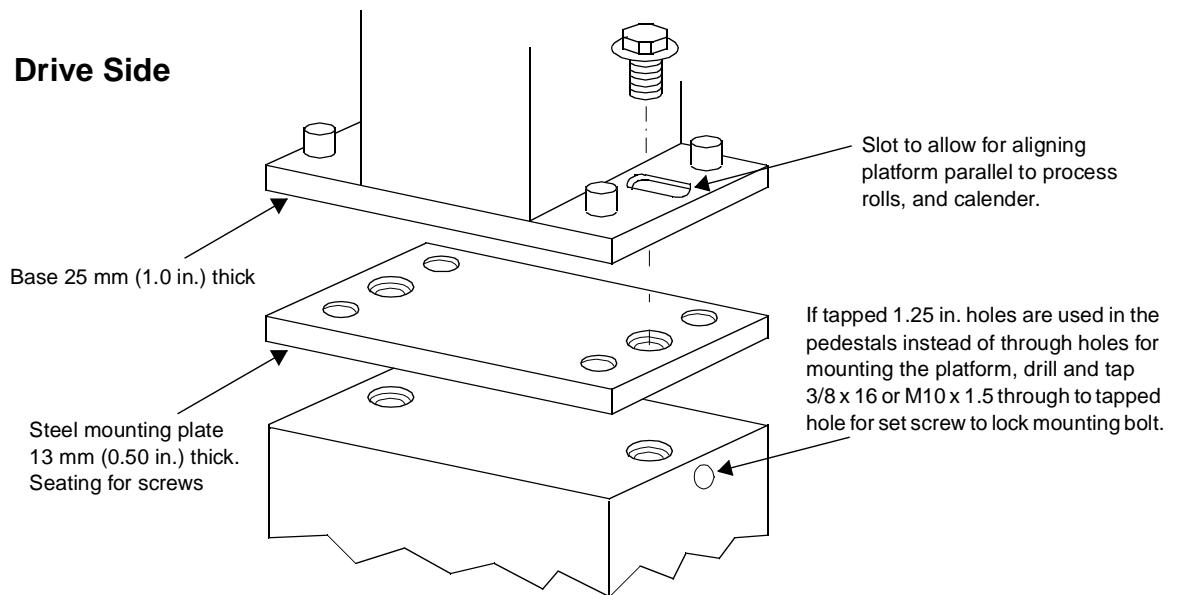
Figure 3-5 Attaching Drive Side of Scanning Platform to Pedestals

Tighten this screw to 1/2 compression of lock washer. Use 1.25 in. or M30 bolt with lock washer and large flat washer (customer supplied). Use a thread–locking compound to avoid vibration loosening. **Screw cannot be tightened hard**; **it is an expansion mount**.

Jack/leveling screws

Idler Side

Thermal Expansion Slot

Base 25 mm (1.0 in.) thick

The top of customer pedestals to pass line is normally 953 mm (37.50 in.). For standard end column includes manufactured plates and 6 mm (0.25 in.) extended set screw, (both end columns).

Steel mounting plate 10 mm (0.375 in.), seating for set screws

Teflon plate 3 mm (0.125 in.) thick

Tapped holes or nut on backside

If tapped 1.25" holes are used in the pedestals instead of through holes for mounting the platform, drill and tap 0.375 x 16 or M10 x 1.5 through to tapped hole for set screw to lock mounting bolt.

Figure 3-6 Platform to Pedestal Installation – Idler Side

5. Make certain that the mounting surfaces on the bottom of the platform are clean and smooth.

6. Coat the entire surface on the bottom of the platform with a corrosion preventive compound.

7. Thread two parallel lengths of wire over the rolls onto which the process is to be guided. See Figure 3-7 on page 39.

    These wires should be placed in the positions that are representative of the outside edges of the process sheet.

8. Suspend a weight of approximately 5 lb. (3 kg) from each end of the wire.
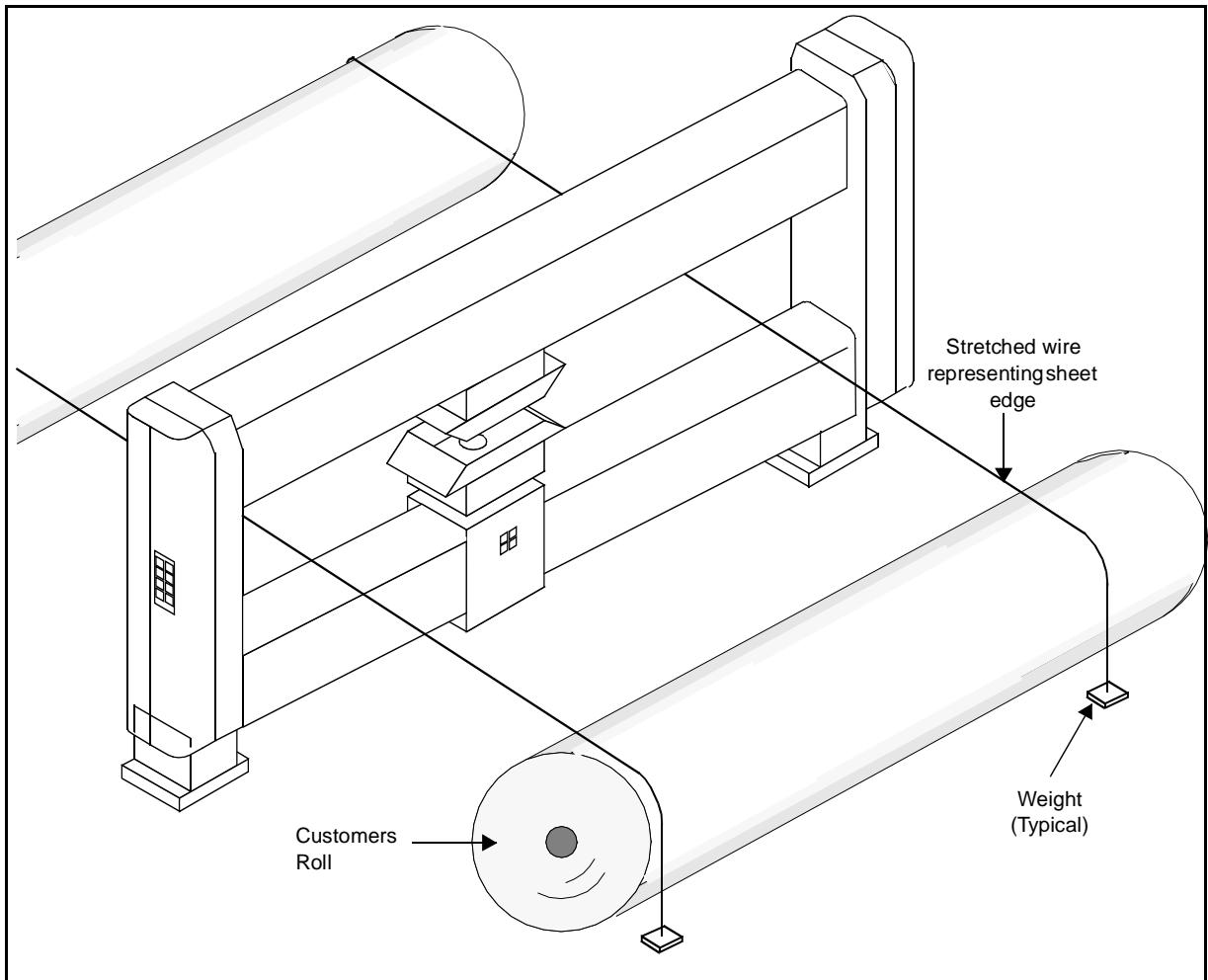
Figure 3-7 Preliminary Alignment Setup

9. Check the dimension from the customer pedestals to the process being
simulated by the wires. Make sure that this dimension corresponds to the
dimension on the Scanning Platform specification drawings. These drawings
are customized for each installation site.

10. Temporarily remove the two parallel lengths of wire to allow placement of the
Scanning Platform.

11. Install eight jackscrews in the platform mounting bases.

See Figure 3-8. The four front (inner most) jackscrews should protrude
0.125 - 0.250 in. (3 - 6 mm) below the mounting surface, and the remaining
jackscrews should be flush with the mounting surface.
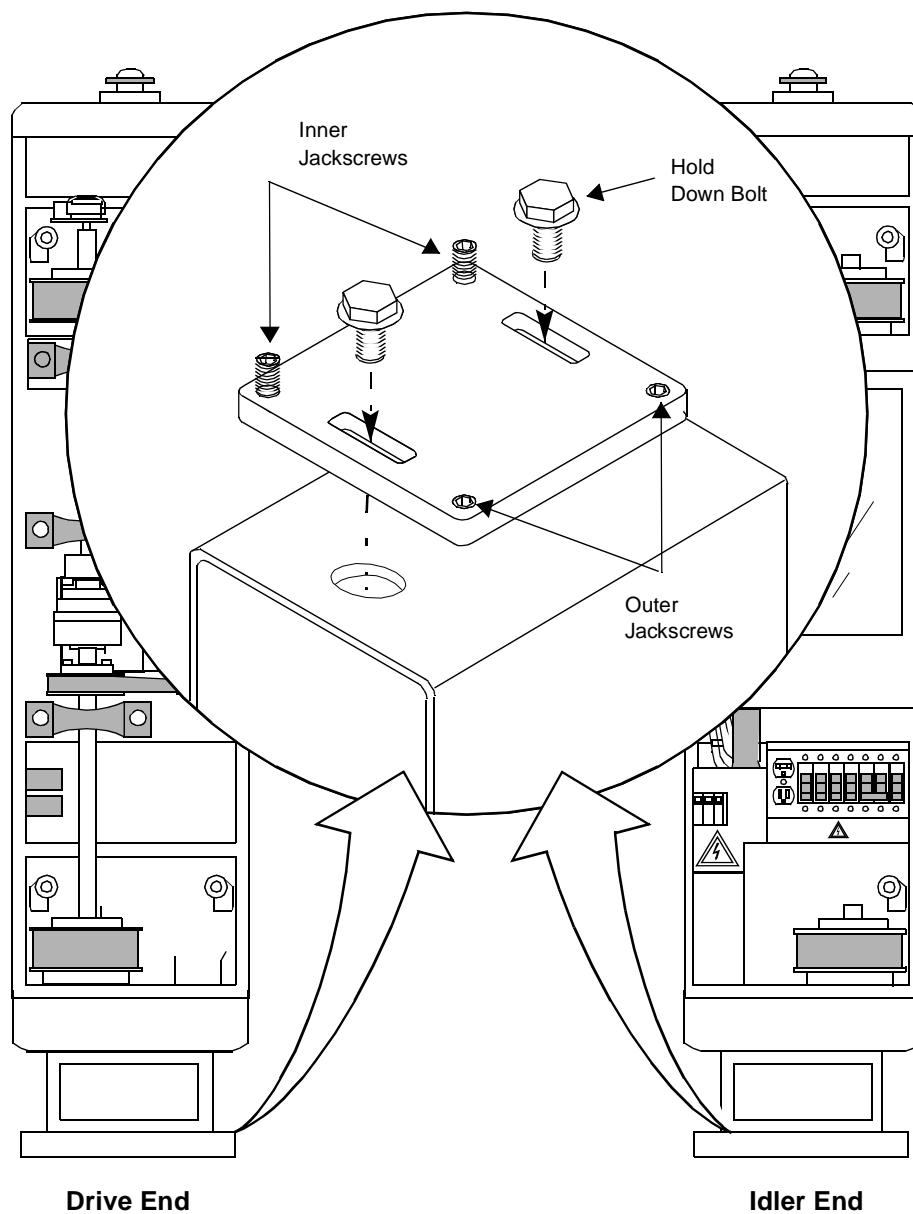
Figure 3-8 Jackscrew Orientation

12. Connect a heavy duty cable or chain through the two large lifting lugs located
on the top beam of the Scanning Platform.

13. Using the lifting device, secure it to the cable or chains connected to the lifting
lugs.

14. Carefully lift the Scanning Platform from the transporting skid or dolly and position it on the customer pedestals so that the platform and the support structure mounting holes are aligned.

    The mounting holes center–to–center dimension should be within 0.125 in. (3 mm) of the dimension noted on the dimensional outline drawing. The dimensional drawing is site specific.

15. Install four customer-provided hold-down mounting bolts, leaving them loose enough for Scanning Platform alignment later.

    The platform is now in position.

16. Rethread the two parallel lengths of wire over the rolls onto which the process is guided. See Figure 3-7 on page 39.

17. Verify that the wire locations represent the outside edges of the process sheet.

18. Separate the head assembly.

19. Manually move the lower carriage assembly close to the wire at one end of the platform.

20. Adjust the jackscrews in the base of the applicable column to position the wire at the center of the source detector air gap. See Figure 3-6 on page 38 and Figure 3-8 on page 40.

21. Move the carriage assembly to the other end of the Scanning Platform.

22. Adjust the front jackscrews to position the wire in the center of the source detector air gap.

23. At the idler end of the platform, compress the lock washer approximately half–way.

24. At the drive end of the platform, tighten the screws securely.

25. Verify that there is approximately equal travel remaining in each direction in the slotted holes in the idler end pedestal.

This completes the preliminary installation of the Scanning Platform.

Platform Alignment

To accomplish alignment of the Scanning Platform, proceed as follows:

1. Place a machinist's level on the leveling blocks located on the inner side of each end column. See Figure 3-9.
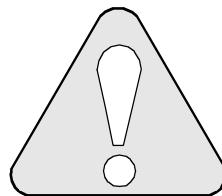
Do not make any adjustments to the alignment block.
The adjustment block is factory adjusted. Any
adjustment will render the block unusable.
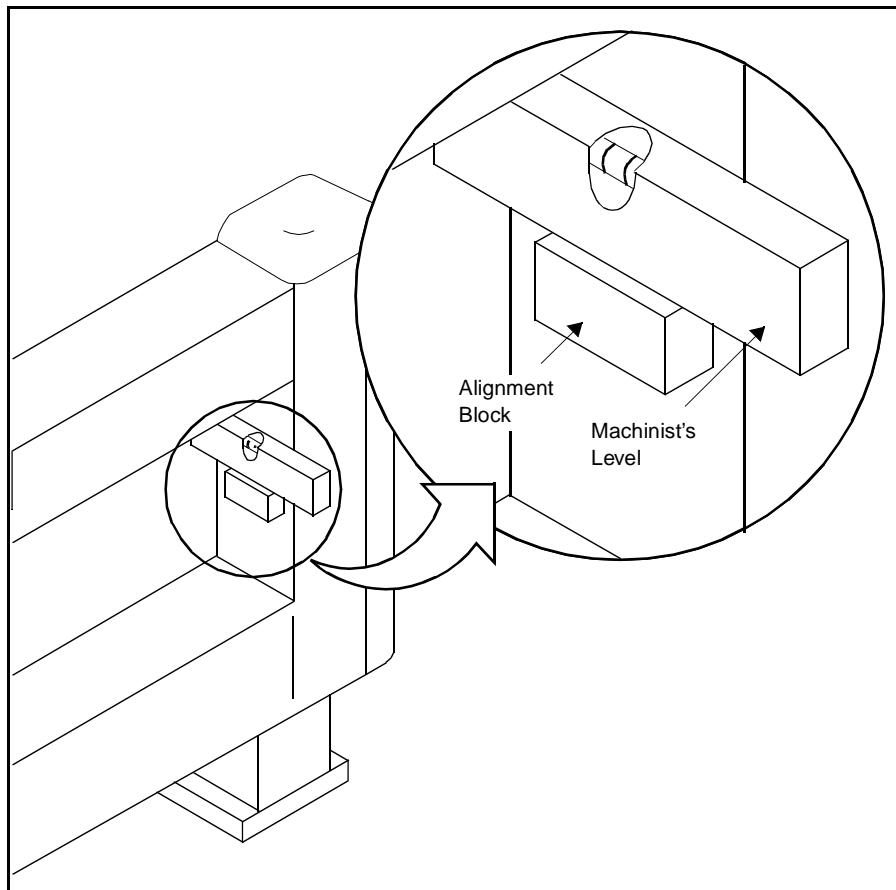
Figure 3-9 Verifying Platform Alignment

2. Loosen the hold-down mounting bolts.

3. Adjust the inner jackscrews on the end column to zero the level at one column, and repeat for the column at the other end of the platform.

    Maintain the same orientation of the machinist's level at both ends of the platform.

4. Check the position of the wire in the air gap to assure that the pass line angle is unchanged. Should the angle appear to have changed, repeat Step 3.

5. Adjust the outside jackscrews down against the mounting support.

    The adjusted jackscrews should be snug, but they should not lift the platform off the front (inner most) jackscrews which are already precisely set.

6. Place the machinist level on the leveling blocks to monitor the final settings and to make certain no changes in leveling occur.

7. When all four jackscrews at one of the columns are adjusted satisfactorily, tighten the hold-down mounting bolts to secure the Scanning Platform to the support structure.
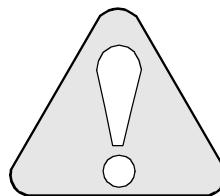
Do not over stress the mounting bolts.

8. Repeat Steps 1. through 7. for the other column.

9. Remove the wires.

This completes the Scanning Platform alignment.

Carriage Alignment

The mechanical alignment (relative positioning) of the sensor's upper and lower heads is critical in maintaining proper measurement characteristics. Both the static (off-sheet) and the dynamic (scanning) alignments must be correct. Static and dynamic alignment conditions (see Figure 3-10) which should be considered for the sensor heads include the following alignments and adjustments:

- Pass Angle Adjustment (page 45)

- Process Direction (lateral alignment) (page 48)

- Air Gap Dimension (vertical spacing) (page 50)

- Scan Direction (horizontal alignment) (page 52)

These alignment and adjustment procedures are in the following sections.
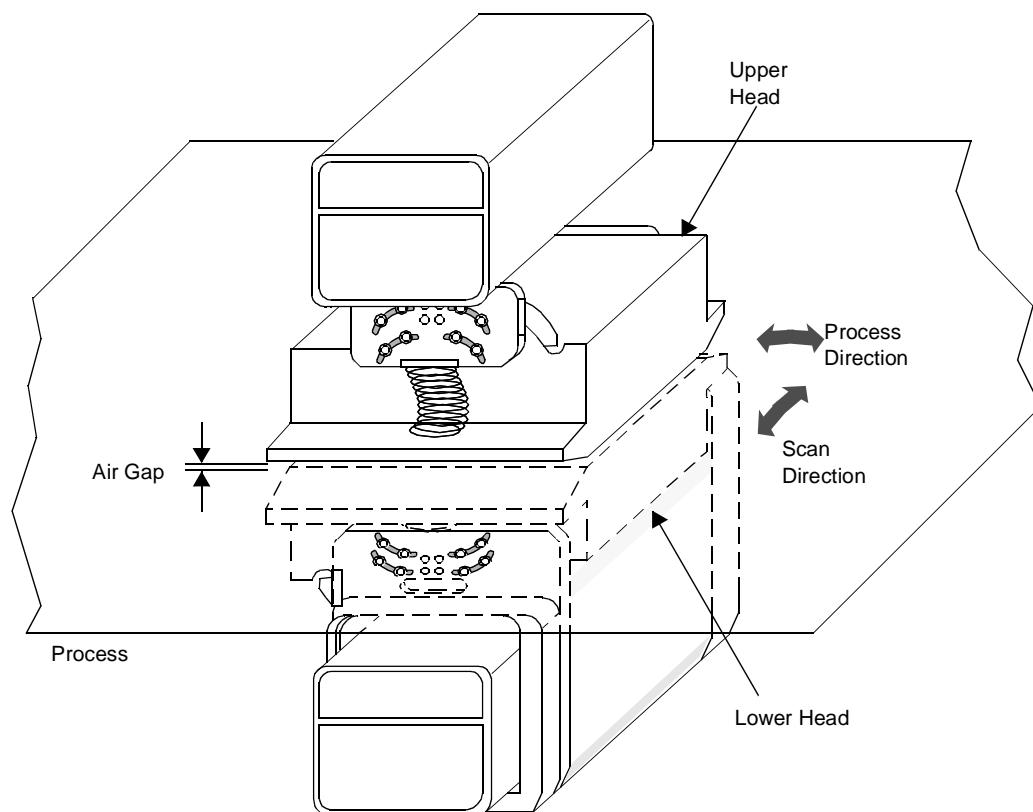
Figure 3-10 Head Alignment Conditions

Pass Angle Alignment

This procedure describes how to make adjustments to the pass angle. To insure proper alignment of the sensor carriage assembly, you will perform a process direction alignment and an air gap alignment at the same time. See Figure 3-11.
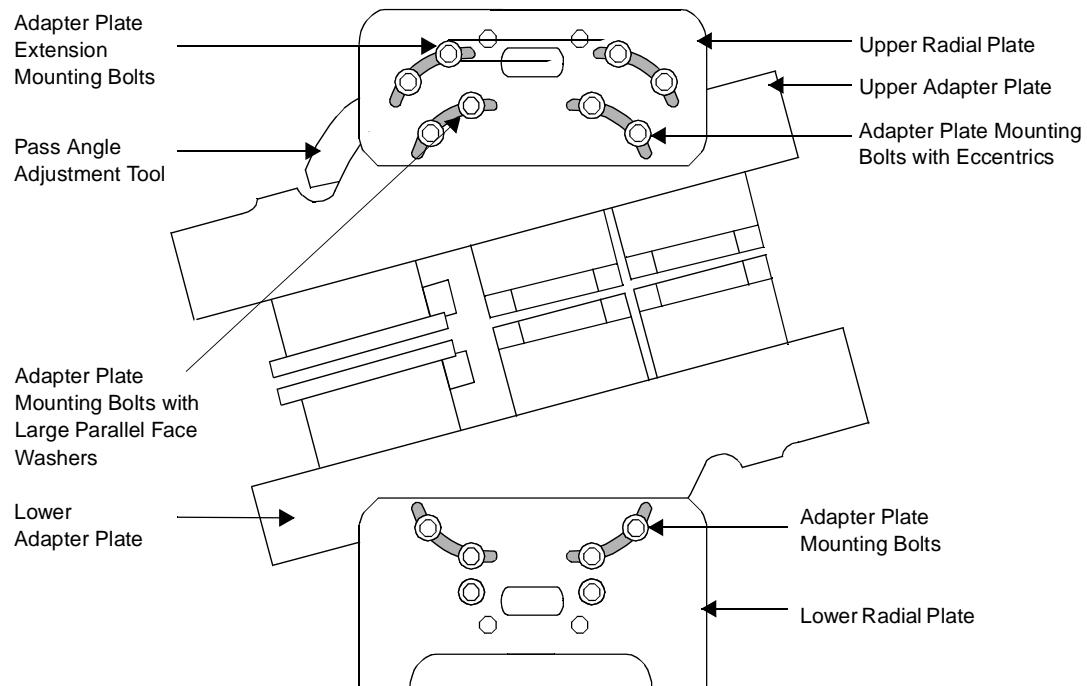
Figure 3-11 Pass Angle Adjustment

Note: Whenever a pass angle change is made, no matter how slight, be sure to follow the procedure below.

1. Move the sensor head package to the off–sheet position.

2. Place the platform in local by pressing the LOCAL push button on the control panel.

3. Turn off the power to the platform.

4. Activate the head separation switch located at either end of the Scanning Platform.

   Deactivating the clutch trips a switch which also causes the platform to enter the local mode.

5. Manually move the bottom head package away from the top head package.

6. Using a 13 mm socket or wrench, loosen the four locking M8 bolts (lower adapter plate mounting bolts) in the curved slots on each side of the bottom carriage. See Figure 3-11 on page 45.

7. Thread two parallel lengths of wire over the rolls onto which the process is
    being guided. See Figure 3-12.

    These wires should be placed in the positions that are representative of the
    outside edges of the process sheet.

8. Suspend a weight of approximately 5 lb. (3 kg) from each end of the wire.
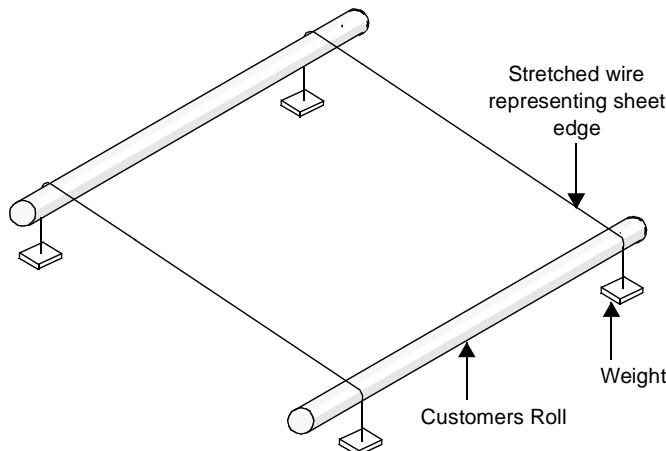
Figure 3-12 Simulating the Process Pass Line

9. Rotate the lower head to the desired pass angle.

10. Tighten the four locking M8 bolts (lower adapter plate mounting bolts) on each
    side of the bottom carriage. See Figure 3-11 on page 45.

11. Remove the top cover of the upper head. .

12. Loosen upper adapter plate mounting bolts and remove the mounting bolts with
    eccentrics. See Figure 3-13 on page 47.

13. Loosen the adapter plate extension mounting bolts. See Figure 3-13.

14. Adjust the four vertical adjustment screws so that the weight of the upper
    carriage rests on the bolts of the upper adapter plate.

    This is done so that when you adjust the air gap between the upper and lower
    sensor heads you have enough slack to move the upper head vertically.

15. Rotate the upper head package to approximate pass angle and move the upper
    head package directly over the lower head package.

16. Rotate the upper head package to match the lower head package angle closely
    by visual inspection.

17. Tighten the upper adapter plate extension mounting bolts. See Figure 3-13.

Note: When aligning the head packages, all reference points will be located on the Basis Weight sensor plate. If a Basis Weight sensor is not present, use the Ash sensor for the alignment reference. If neither Basis Weight or Ash sensors are present, use the Basis Weight/Ash sensor blank base plate.

18. Align the upper and lower base plates of the Basis Weight sensor using the procedure for Process Direction Alignment beginning on page 48.

19. Continue with the "Air Gap Alignment" on page 50.

20. Perform the "Scan Direction Alignment" on page 52.
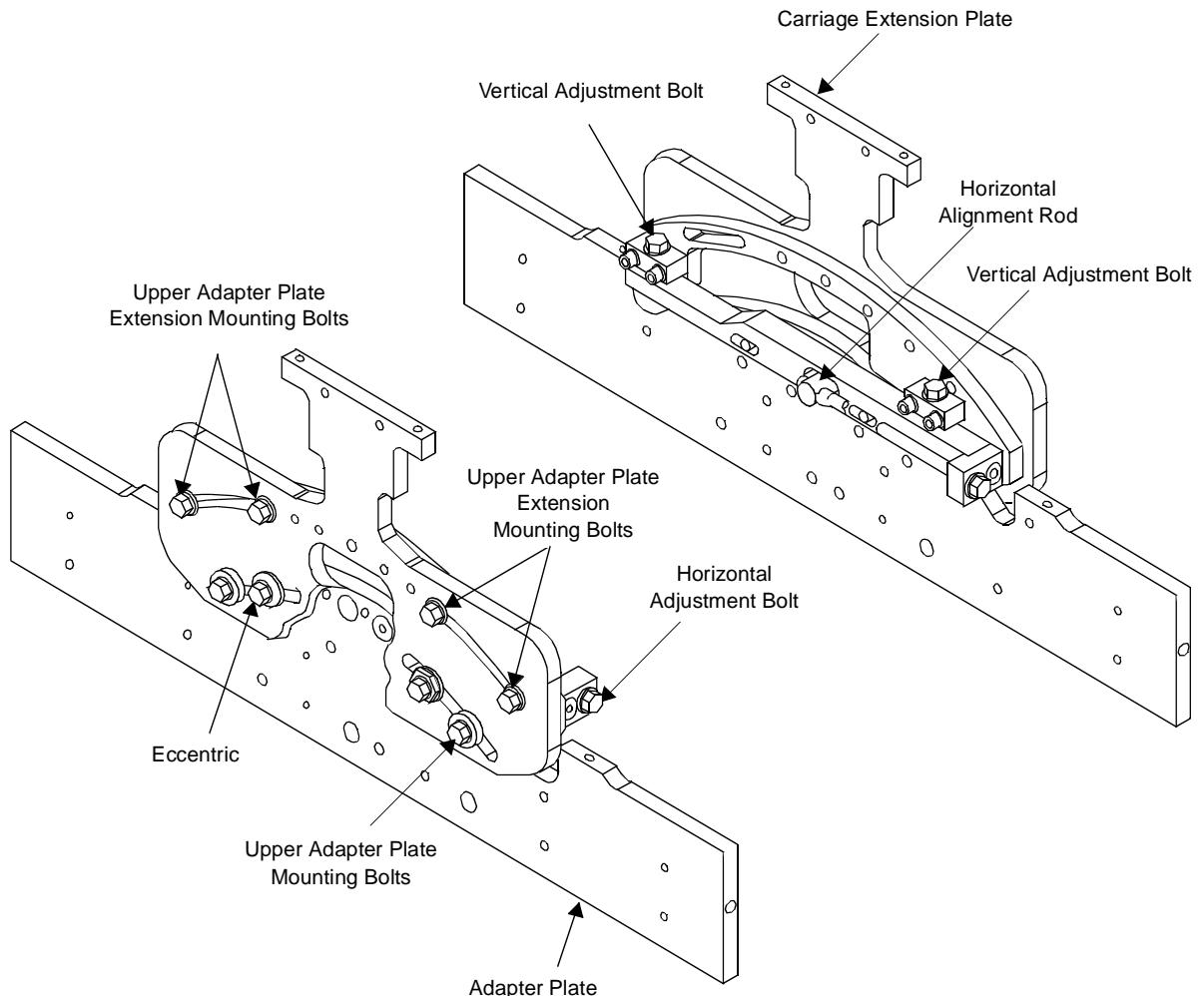
Figure 3-13 Pass Angle Adjustment Tool

Process Direction Alignment

Note: When aligning the head packages, reference points will be located on the Basis Weight sensor plate. If a Basis Weight sensor is not present, use the Ash sensor for the alignment reference. If neither the Basis Weight or Ash sensors are present, use the Basis Weight/Ash sensor's blank base plate. If a Smart Caliper GT is present, one reference point will be located on the caliper sensor.

1. Use a machinist straight edge [or the back side of the air gap tool (Part Number 128624-001)] to make certain that the upper and lower heads are parallel. They should be flush within ± 0.005 in. (0.127 mm). See Figure 3-14.
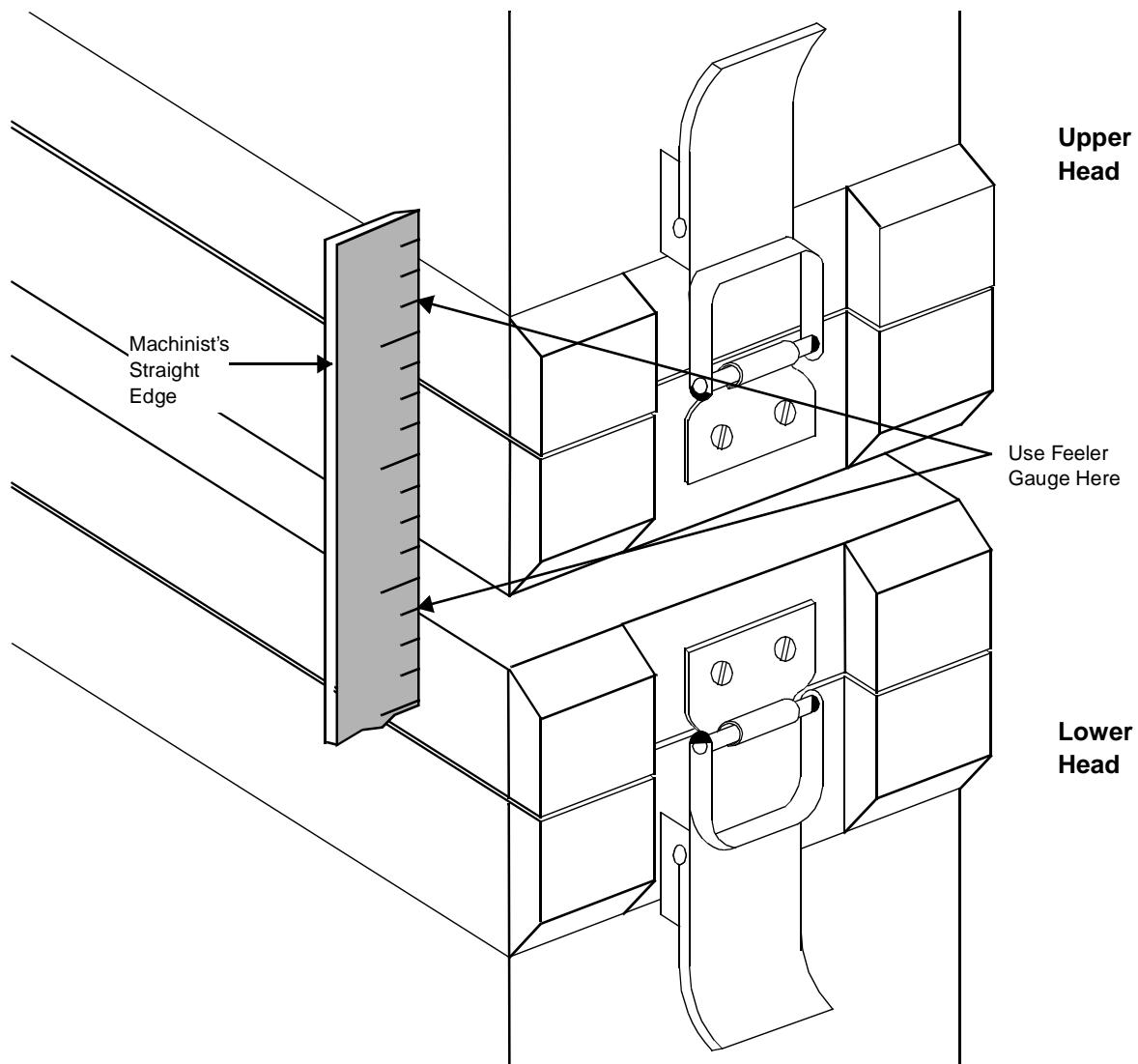
Figure 3-14 Process Direction Alignment Points

2. Place the straight edge against the machined surface on the upper and lower base plates of the Basis Weight sensor. If the plates are perpendicular to the straight edge, they are parallel to each other.

3. Align the upper head to the lower head using the horizontal adjustment bolts on the adapter plate extension. See Figure 3-13 on page 47.

4. Turn the horizontal adjustment bolts clockwise to move the upper head towards you; counterclockwise to move the upper head away from you.
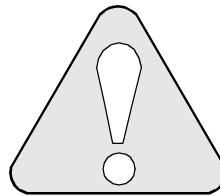
Do not force the horizontal adjustment bolts if binding is felt. Instead, loosen both bolts before resuming alignment.

The horizontal adjustment bolts have to be adjusted with respect to each other to avoid binding the upper head carriage. For example, every half-turn of one horizontal adjustment bolt necessitates a half-turn to the other.

Air Gap Alignment

Refer to Figure 3-13 on page 47 and Figure 3-15 while performing the air gap alignment procedure.

1. Use the vertical adjustment bolt to achieve a 7.5 ± 0.5 mm (0.295 ± 0.020 in.) cold air gap between the base plates along the on-sheet end of the sensors and at the points designated in Figure 3-15. For every half turn of a vertical adjustment bolt, do a half turn to its opposite adjustment bolt. Across the sensor window, check the distance using the air gap tool provided with the platform. If bolts seem to bind at any time, adjust the opposite side air gap before proceeding.

Note: You need to protect the carriage assembly from damage from mechanical forces by not positioning the vertical adjustment bolts such that the weight of the carriage is supported on three bolts instead of four as this may twist the carriage. Also, never rest the upper head package weight on the lower head package by leaving the air gap tool between the sensors.

2. Adjust the off–sheet side air gap to 7.5 ± 0.5 mm (0.295 ± 0.020 in.) cold.

3. Continue to adjust the vertical adjustment bolts until the specified air gap is achieved.

4. After acceptable air gap is set, make certain the sensor is still aligned in the process direction. See the "Process Direction Alignment" on page 48.

5. Tighten the bolts which have large parallel face washers onto the upper adapter plate.

6. Replace bolts with eccentrics.

7. Rotate the eccentrics on the adapter plate extension so that they bear the weight of the upper head assembly.

8. Tighten the bolts that hold the eccentrics in place.

9. To insure that the top electrical covers will fit, the alignment mechanism should be centered over the adapter plates.

    a. Loosen adapter plate extension mounting bolts.

    b. Use the horizontal alignment bolt to center the alignment mechanism over the adapter plates.

    c. Center the horizontal alignment rod in its slot.

    d. Tighten the extension mounting bolts.

10. Tighten the bolts on the adapter plate, both sides.

11. Replace the electrical covers.

This completes the Air Gap Alignment Procedure.

WITH SMART CALIPER GT

Alignment Points

At each alignment point, set gap to
7.5 ± 0.5 mm (0.295 ± 0.020 in.) cold.

WITHOUT SMART CALIPER GT
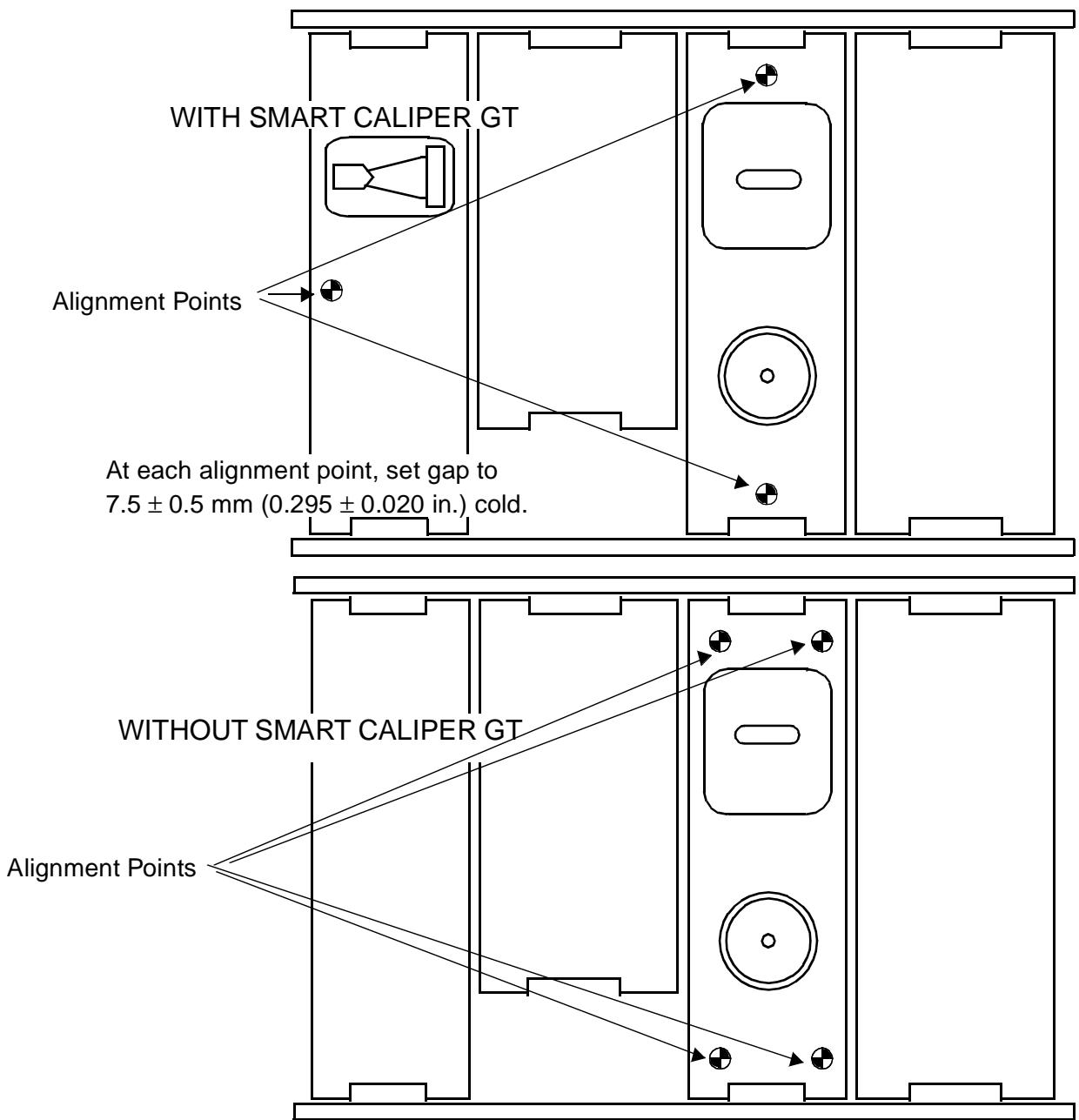
Alignment Points

Figure 3-15 Air Gap Alignment Points

Scan Direction Alignment

The scan direction alignment is checked both close to the drive end column and close to the idler end column on the scanner.

Alignment at the drive end is set by drive pulley phase adjustment. Alignment at the idler end is controlled by belt tension.

The scan direction alignment procedure is as follows:

1. Jog the sensor heads near the drive end column.

2. Apply a straight edge and feeler gauge to the machined surface on the upper and lower sensor heads. See Figure 3-16.

Upper Head

Use Feeler Gauge Here

Machinist's Straight Edge

Lower Head
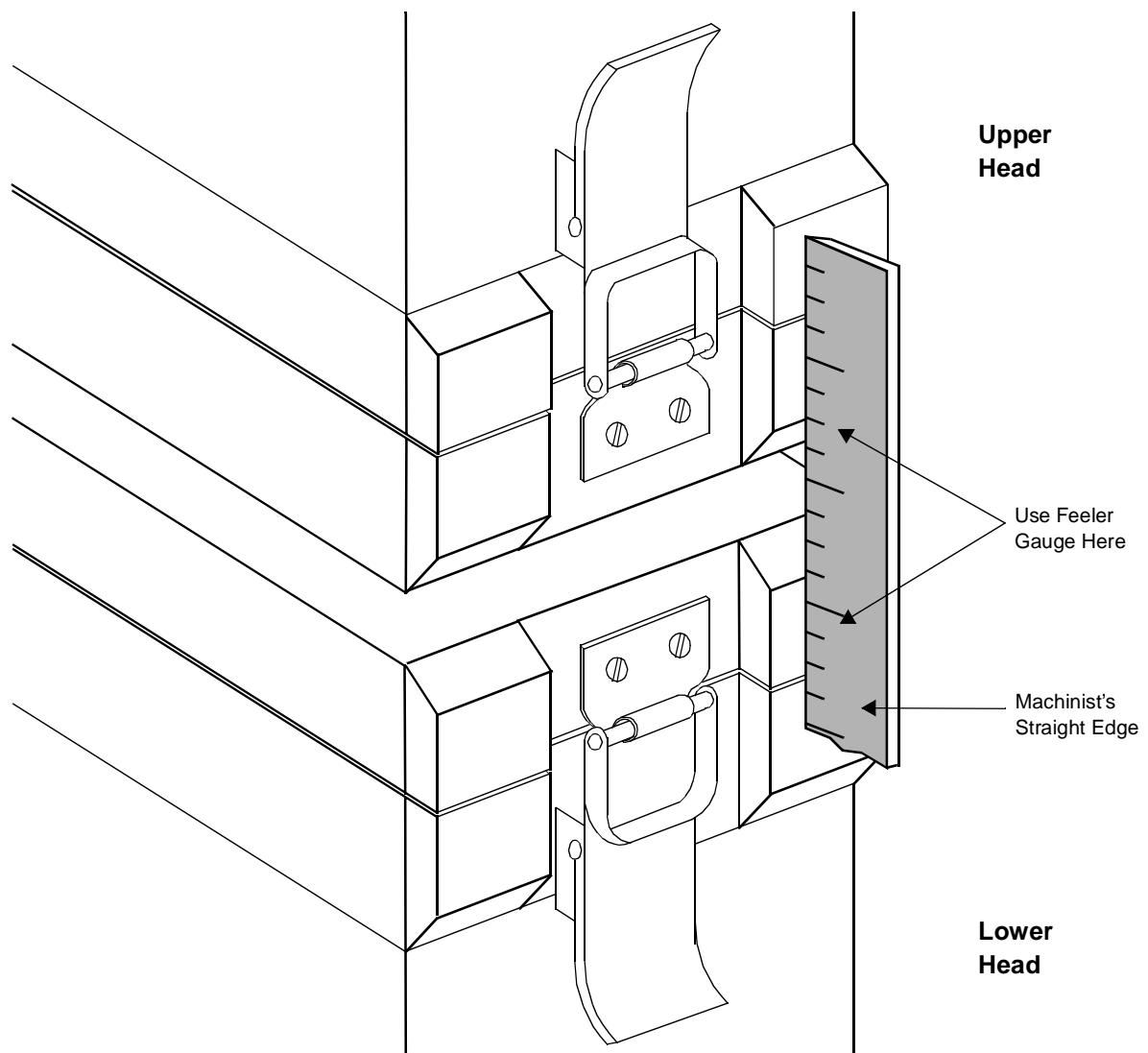
Figure 3-16 Scan Direction Optimum Alignment Point

The machined ears should be flush within ± 0.005 in.. If they are not:

    a. Loosen the upper drive belt pulley locking screws.

    b. Adjust set screws for phasing of the pulley until the heads are parallel.

    c. Tighten the screws when finished.

3. Jog the heads near the idler end column.

4. Apply a straight edge and feeler gauge to the machined surface on the upper and lower heads.

5. If they are not aligned in the scan direction within ± 0.010 in., adjust the belt tension in the upper or lower belts by means of the idler bracket adjustment screws. See Figure 3-17.
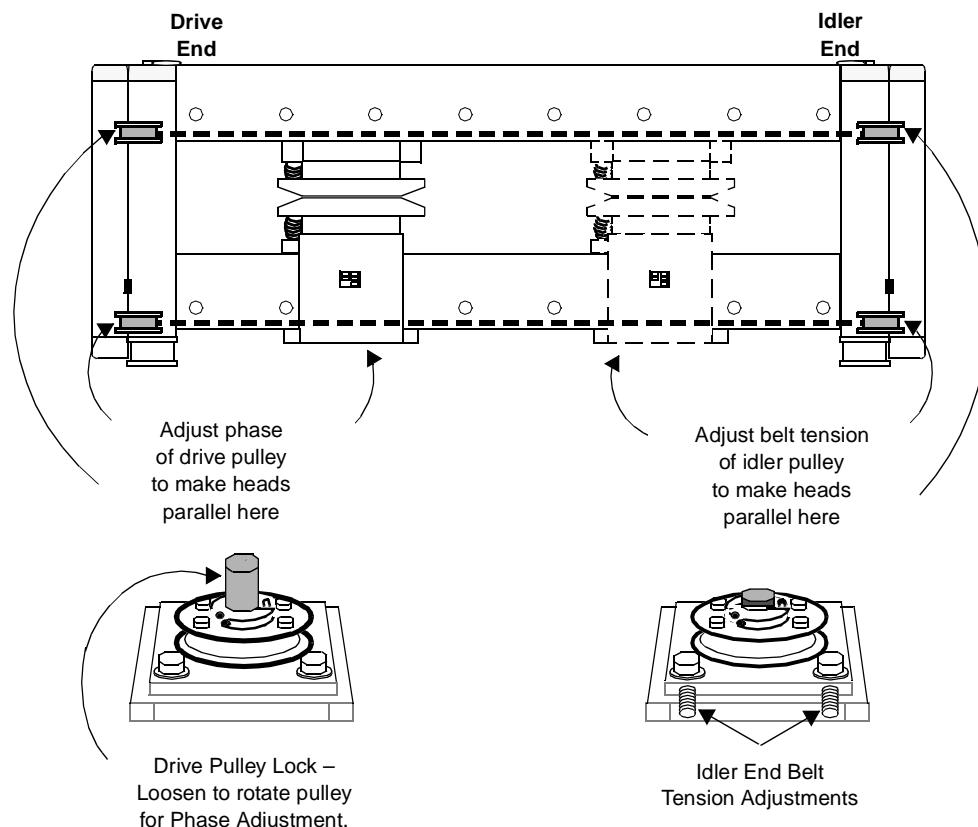
Figure 3-17 Scan Direction Adjustment

6. Use belt tensiometer (Part Number 122146-004) to check the belt tension. The range is specified on the tensiometer.

Note: The belt may be installed in such a way that the upper and lower heads are off by more than one tooth on the belts. This can be corrected by inserting a short strip of thin sheet metal or hard plastic between the belt and drive pulley and allows for manual alignment to the next tooth. See Figure 3-18.
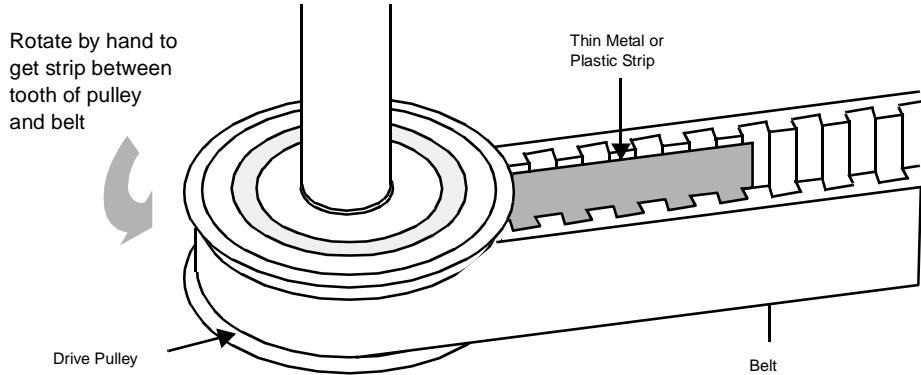
Figure 3-18 Manual Alignment Setup

4

Utility Service Installation

This chapter contains the following major sections: :

Air Purge

The Scanning Platform is air purged to assure reliable operation in a paper mill environment. The purge air duct is attached to the idler end column either directly or with a flexible air hose. If a flexible air hose is used, the flexible portion of the hose should be less that 10 ft. (3 m) to avoid a drop in pressure. See Figure 4-1.

NOTE: Designed to accommodate
6" I.D. Duct

Typical
Installation

Idler End Column
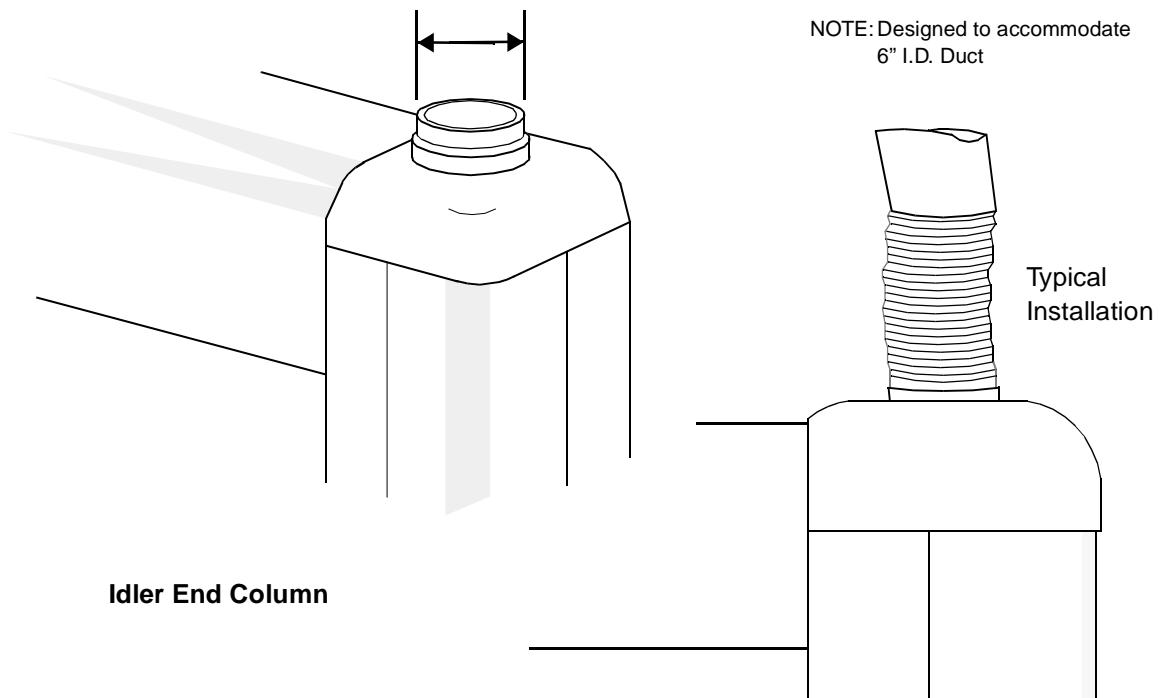
Figure 4-1 Purge Air Duct Attachment

Note: Do not allow the weight of a heavy metal air duct to rest on the plastic top cap. Off load the duct by means of bracing to the machine foundation or use a flex ducting.

The source of air for air purge can be supplied by either the DC motor cooling air or the ABB purge blower. Clean DC motor cooling air has the advantage of no special air filter maintenance and is generally preferred when available. If the DC motor cooling air is used, an adjustable damper is needed to reduce the air flow and avoid excessive system pressure loss (especially when the doors are opened).

For installation of the ABB purge blower, refer to the instructions which are supplied on the illustration drawings.

Normal applications should operate with the platform fully sealed. For high temperature applications, a continuous air flow must be supplied through the scanner beams to the drive end.

Air and Water Supply

Sensors require clean, oil free, dry compressed air for operation. The pressure at the platform air inlet ports must be at least 4.4 bar (65 psi) and a maximum of 5.4 bar (80 psi). The air flow depends upon the sensor configuration and the adjustment of the manifold valves (the range is typically 0.37 m^3/min (13 scfm) to 0.6 m^3/min (21 scfm). Refer to the appropriate sensor manuals for further information.

The liquid cooling unit provides a closed loop water circulation system to the electronics on the platform and IR sensors. The liquid cooling unit requires secondary heat exchange, a water supply of less than 80 °F (27 °C), and a flow of typically less than 5 liters/min (1.5 gpm). illustrates a typical hook-up.

During installation make sure that the liquid cooling unit is filled according to instructions and that the air supply is on before proceeding with the electrical power up.
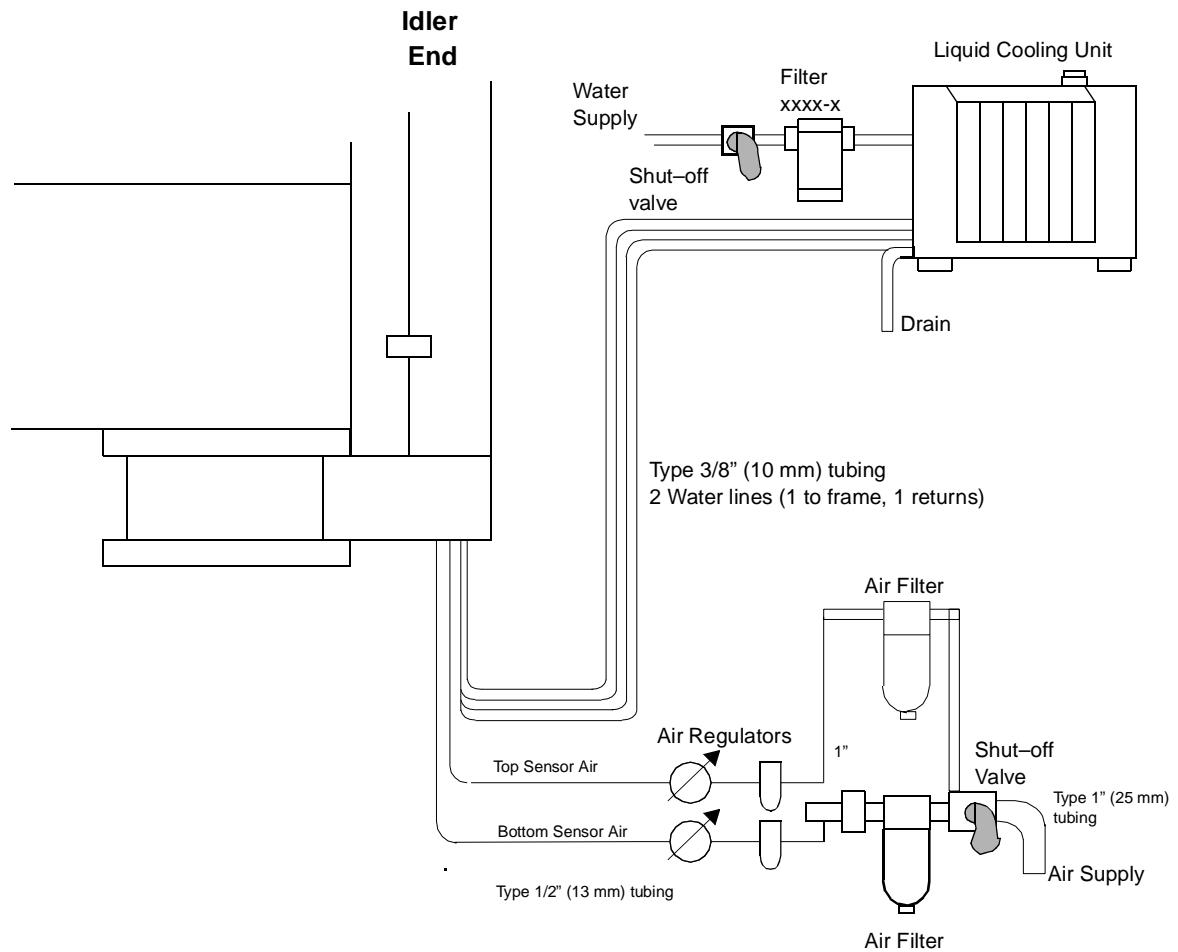
Figure 4-2 Air and Water Hookup

Electrical Hook-Up

Cabling to a Scanning Platform is minimal. All that is normally required for hook-up are the AC power, serial communication loops to the host system and Service Workstation, sheet break detector, Liquid Cooling Unit (LCU) flow switch(es), and reel turn-up detector. Other auxiliary equipment (for example, microwave or smoothness processors), depending upon the configuration, may also require cables to the ABB Smart Processing Center (ASPC).

For details of the TCP-IP Ethernet connection to the 086444-xxx MPRC, see ABB Functional Drawing 086424-201. This drawing outlines the details of the required 132573-001 "Y" cable which plugs into J6 "HOST" connector on the ASPC backplane. It also shows the redundant Ethernet port which exits the electronics enclosure through an aluminum shield grounding block attached to the front door of the ASPC. This redundant Ethernet port is normally not present. A Fiberoptic Transceiver (ABB 102204-001) is required to meet CE Mark Radio Frequency emissions and susceptibility requirements. Using twisted pair or coaxial Ethernet transceivers is not certified to meet CE Mark. The suggested fiberoptic cable is ABB 102205-001 with 102206-001 "ST" connectors. These "ST" connectors require special tooling such as the ABB 102206-100 tool kit.

The platform is connected to customer power via the Scanning Platform Power Distribution Center (SPDC). The SPDC also provides the power for the purge blower, Liquid Cooling Unit (LCU), and various auxiliary equipment. The SPDC is an integral part of the SP electrical design and is required to meet electromagnetic compliance (EMC) specifications and standards. See Figure 4-3.
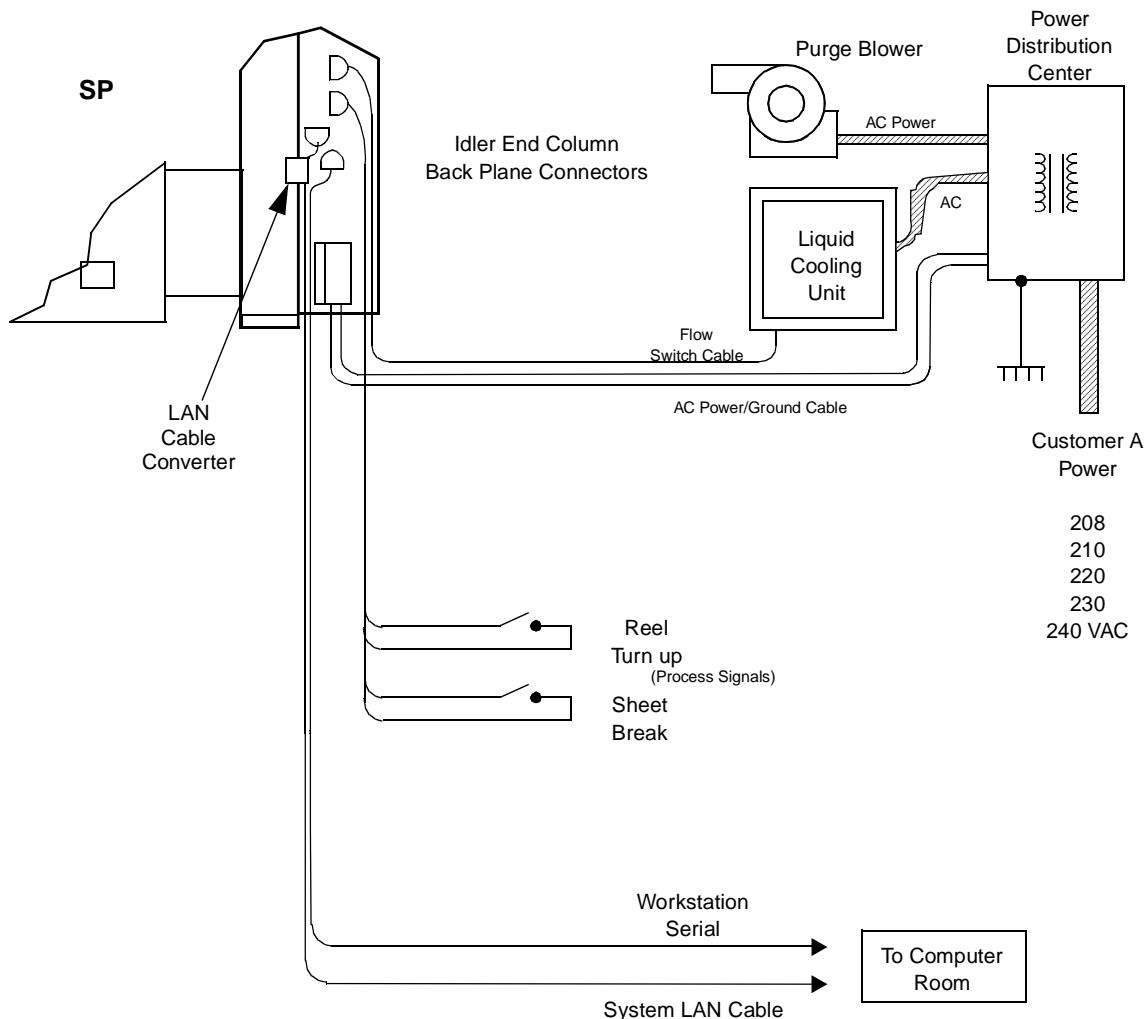
Figure 4-3 Standard Cable Configuration

The main supply to the SP is to be from the same supply as the host system. If there must be a deviation, then the two supplies must be banded to the same ground (single point earth reference). The introduction of an extra grounding system such as an instrument ground is absolutely forbidden.

A neutral to ground bond must exist on the secondary side of the SPDC. This bond must be in the SPDC and only in the SPDC.

The SPDC is 10 KVA to handle the largest SP system. Your particular installation will probably not actually consume that much power. The input wiring, fusing, and disconnect should, however, still be sized for the full 10 KVA.

Allowable input voltages to the SPDC are:

•   Rated Input Voltage: 240, 230, 220, 208, or 200 volts $\pm$ 10%

•   Rated Frequency: 50 or 60 Hz $\pm$ 1%

The secondary is always wired as 120/240.

SP Power Up Procedure

The following power up sequence is required to ensure no wiring errors or malfunctioning equipment cause a failure that could jeopardize a successful installation.

1. Verify power is tagged off and locked out at the Motor Control Center (MCC).

2. Verify all circuit breakers in the SP and the SPDC are turned off (see Figure 4-4).

Head Split Switch
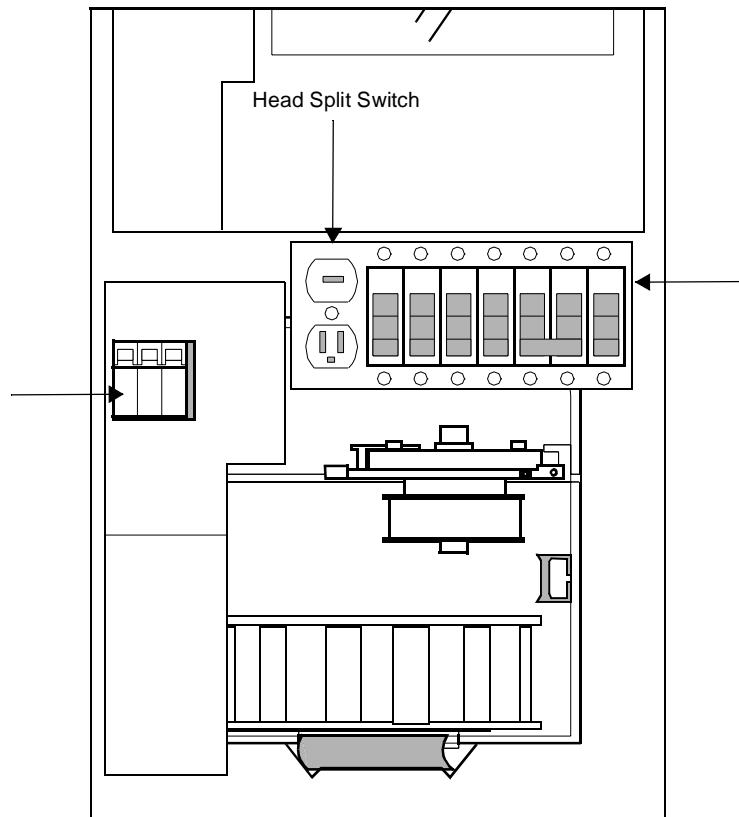
Figure 4-4 Circuit Breakers

3. Install all required wiring. The connection terminals for the main supply to the SP are located behind the cover over the main circuit breaker. The phase conductors terminate directly to the main circuit breaker; neutral and ground to the adjacent terminals.

4. Remove all debris from the installation work and vacuum the enclosure. Verify no tools or assembly material were left in the equipment.
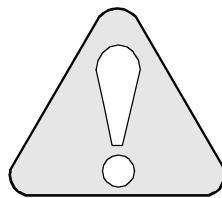
The neutral to ground bond is extremely important. If it is not correct, the electronic filter in the ASPC may be destroyed when power is applied.

5. Verify there is a neutral to ground bond at the SPDC, and ONLY at the SPDC. Ensure that the primary and secondary are correctly terminated.

6. Remove the lock-out on the MCC and turn on the power to the SPDC. Measure the primary voltages (phase to phase, phases to neutral, and phases to ground) to verify proper power, grounding, and tap selection.

7. Turn on the SPDC main circuit breaker and measure the secondary voltages (phase to phase, phases to neutral, and phases to ground). The output must be 240 VAC ± 10% phase to phase; and 120 VAC ± 10% each phase to neutral and each phase to ground.

8. Turn on the SPDC circuit breaker for the purge blower. Verify that the blower starts. Check that the voltage at the blower is 240 VAC +10%, -14%. Verify there is air flow inside the idler end column of the SP.

9. Turn on the SPDC circuit breaker for the Liquid Cooling Unit (LCU). Verify that the coolant starts circulating. Check that the voltage at the LCU is 240 VAC +10%, -14%. Check for leaks.

10. Measure the input voltages on the line side of the Scanning Platform main circuit breaker. The SP input must be 240 VAC +10%, -14% phase to phase; and 120 VAC +10%, -14% each phase to neutral and each phase to ground.

11. Turn on the SPDC circuit breakers for any auxiliary equipment and verify the voltage is within tolerance at each load.

12. Securely fasten all of the SPDC covers.

13. Switch on the SP main circuit breaker and the Service circuit breaker. Check for 120 VAC at the service outlet.

14. Turn on the Motor, Top AC, and Bottom AC circuit breakers. Check for 120 VAC at the top and bottom carriage diagnostic connectors using the test card kits supplied with the system. Measure the 120 VAC with respect to the chassis.

15. Turn on the DC and IR circuit breakers. On the ECPSR, verify the green DC IN, +15 volts, -15 volts, and +5 volts LEDs are all on and the red DISABLE LED is off.

16. With the power now fully on, re-verify the input voltages at the SP main circuit breaker. The SP input must still be 240 VAC +10%, -14% phase-to-phase; 120 VAC +10%, -14% each phase-to-neutral and each phase-to-ground.

17. Turn off the SP main circuit breaker.

18. Securely fasten the power entrance cover.

Note: 1. After the initial power up sequence, it is not necessary to turn off each individual circuit breaker. Just using the main circuit breaker is sufficient.
2. Do not turn on the DC circuit breaker before turning on the TOP AC and BOTTOM AC circuit breakers. The ECS/SMIs use timers to turn on the various sensor heaters in a delayed sequence. These timers start as soon as the SMIs finish their start up. If the DC circuit breaker is turned on too long before the TOP AC and BOTTOM AC circuit breakers, the resulting current surge to all the cold heaters may cause the main circuit breaker to trip.

19. Turn the main circuit breaker back on and check the following:

    a. Control panel lights should illuminate in a start-up sequence ending with the green source symbol and Local lights on.

    b. All other PC boards in the ASPC should illuminate their lights with a start-up sequence that initially shows red lights and within two minutes have stationary or blinking green lights. If the MPRC red Error LED continues to blink, you should load the BRAM software.

    c. The motor controller, located on the drive end column, should have the on light illuminated.

    d. The fans at the motor controller and in the electronics cabinet should operate.

20. Push the MAINTENANCE push button on the control panel. The lights on the panel should illuminate in a sequential pattern.

21. Push the JOG FORWARD and JOG REVERSE push buttons to verify that the head moves as instructed.

22. Select the REMOTE push button and verify that the remote and off sheet lights are illuminated, and that the heads travel to the home limit switch and continue to the off sheet position.

23. Execute a local standardize from the control panel. Verify that the light is illuminated and a standardize cycle is executed. The shutters should open and the Caliper sensor should close during this cycle. A successful standardize for all sensors is indicated by the standardize light not blinking after the cycle is completed.

24. Select on sheet at the platform. The on sheet light should illuminate if the communication to the Host is proper and if the sheet break signal is indicating no break (closed contact).

Note: Until this time, the system has been operating without any regard to the set up and tuning of the software load. There are several procedures required to ensure that the configuration, platform tuning, and sensor tuning are appropriate for the installation. Please refer to "Measurement Setup" on page 107; the *STLP-3 and STLK-11 Basis Weight Sensor Operations Manual (3BUS 208 129 RXX01)*; and the appropriate *Scanning Platform System Software Manual, 3BUS 208 [049-054] RXX01.*

For an explanation of the various LEDs on the ECPSR and MPRC, see Table 11-1 on page 227, Table 11-3 on page 229, and Table 11-4 on page 230.

Starting Up the Software

The Service Workstation allows for direct interaction with the Scanning Platform to allow for initial software loading, tuning of the scanner and sensors, diagnostics, and monitoring. In order to proceed with platform or sensor setup, the Service Workstation and the Scanning Platform software must be activated. Once the Scanning Platform software is loaded in the BRAM of the end column boards, the content has battery backup for several days, and the platform software can be repeatedly restarted by means of the RESET button on MPRC, by the power down and power up cycle, or by Service Workstation commands.

For the initial configuration and software loading of the Service Workstation and the Scanning Platform, please refer to the appropriate *Scanning Platform System Software Manual, 3BUS 208 [049-054] RXX01*.

For subsequent start up, please refer to .

Note: It is possible to run the Scanning Platform software independent of the Host. All procedures, except where specifically noted, can be executed by local commands using the control panel and Service Workstation.

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5

Platform Tuning

This chapter describes the activities required to set up and tune the scanning control for the Scanning Platform.

This chapter contains the following major sections:

Section ....Page

Platform Software Setup Checklist

Scanning Platform software setup ensures efficient movement of the Scanning Platform head package and the correct positioning of the head package on the process sheet.

This checklist is a recommended sequence of steps to correctly set up the Scanning Platform.

❒ Use the Electronics sections of the Health Reports to make certain there are no safety interrupts which might impede the setup process.

❒ Check for alarms while tuning the frame. Electronics and Frame alarms are explained in "Troubleshooting".

❒ Set up the motor controller (page 77).

❒ Perform basic Scanning Platform tuning–head position calibration and automatic motor control tuning (page 81).

❒ Set up the Scanning Platform position values (page 88). If required, set up select positions in the host computer.

❒ Restart the communications between the Host computer and the Scanning Platform (required to download Host head positions to the Scanning Platform).

❒ Head Package Dimension Setup (page 92).

❒ Set up the Auto Edge-of-Sheet (AEOS) detectors, if configured on the Scanning Platform (page 97).

❒ Set up the head motion restriction sensitivity if required by the installation site (page 102).

Frame Tuning (ft) Menu Selections

NOTE: After modifying any of the instance variables, remember to save the data to diskette either using the exit save commands within *ft, or by doing* a **gstore** to the appropriate frame or **io** community later.

ENTER
ft
UTILITY

1

2

MODIFY
VALUES

DISPLAY
STATUS

1 2 3 4 5 6 7 8

CURRENT
SCANNER
POSITION
VALUES

CURRENT
SPEED

1

HEAD POSITION
MOTOR
CONTROLLER
CALIBRATION

2

MOTOR
CONTROLLER
CALIBRATION

3

SCANNER/
SHEET
POSITION
SETUP

4

SCANNER
SPEED
SETUP

5

6

SCANNER
AUTO EDGE
SETUP
(if configured)

CURRENT
SCANNER
REVIEW
OPERATION

CURRENT
SCANNER
REQUEST LIST

CURRENT
SERVO
STATUS

CURRENT
AEOS
VALUES
(if configured)

SCANNING
MONITOR

ENGINEERING
DISPLAY

MANUAL
SERVO
CALIBRATION

1	Scanning Monitor
2	Servo Global Data
3	Servo State Data
4	Servo Timing Data
5	Servo Trajectory Data
6	Servo Tuning Data
7	Frame Data
8	Encoder Data

Figure 5-1 Menu Tree

Motor Drive Setup (ABB ACS-100)

General Description

The direction and speed of the AC motor which moves the sensor head package is managed by a motor drive. It determines how much torque to apply as the head package traverses the frame.

The ABB ACS-100 Motor Drive (part number 133853-001) is the replacement for both the Fincor and Lovejoy motor controllers. See "Motor Drive Replacement (ABB ACS-100)" on page 209 for upgrade kits. It uses a removable digital control panel (MDPanel) to set the various tuning parameters. Motor drive assemblies shipped from Columbus, Ohio, arrive preprogrammed with the standard Scanning Platform setup. These settings should provide proper performance for all scanners except Smart U-Frames. For Smart U-Frames, the values for Parameters 202 and 306 must be entered manually. Should any tuning parameters change, it will be necessary to rerun the Motor Drive Tuning routine (ft) in the software.

Control Panel Functions

The MDPanel is the only access to the Motor Drive provided for setup and diagnostics. It can be detached from the motor drive, but should only be removed when the motor drive is in REMOTE mode. The MDPanel can also be used to copy parameters from one motor controller to others. See "Downloading Parameters" on page 74.

Figure 5-2 MDPanel

Platform Tuning 3BUS 208 000 R1301
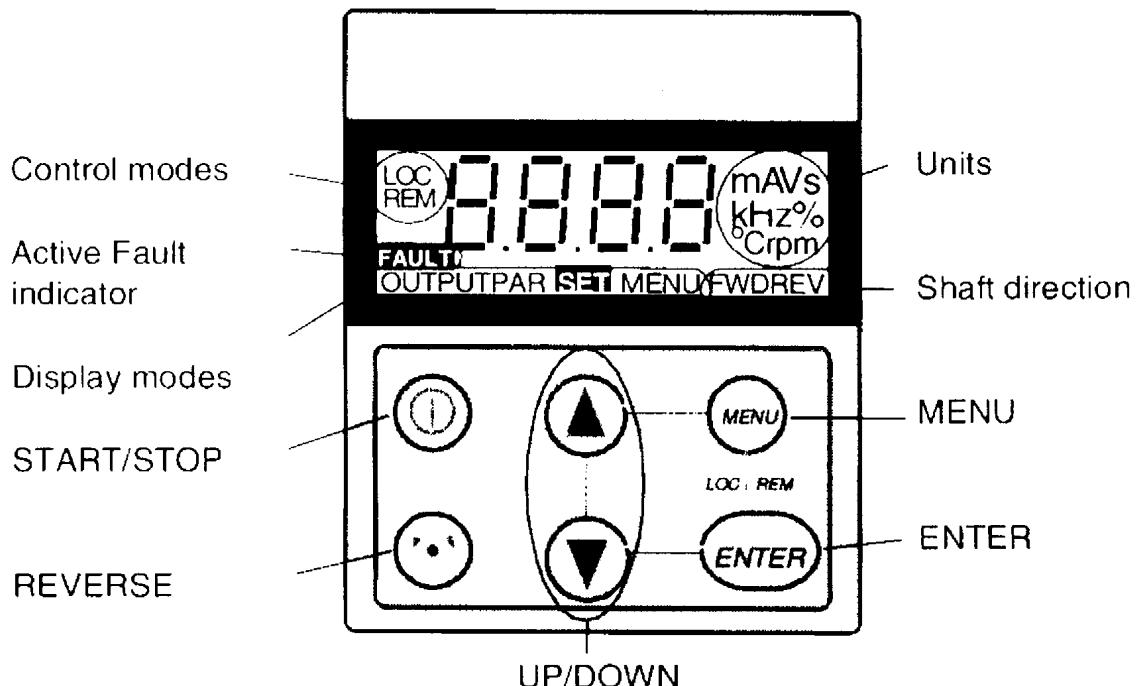
The push buttons, on the MDPanel, are used to navigate around a menu to give access to the various tuning parameters. These parameters are organized into five groups, 01 through 05. See Table 5-1 on page 72. Each group has three or more subgroups. With the exception of the Smart U-Frame, all scanners should be able to operate with ABB SP Default parameter values. These defaults have been stored in the MDPanel to facilitate ease of setup.

The push buttons used in this application are:

• MENU

• ENTER

• UP/DN arrows

The two buttons to the left are not used. The LCD displays menu selections, parameter values, and fault conditions. Appropriate parameter units are displayed along with the values.

Coded alarms which appear on the display can be decoded using Table 5-2 on page 76.

Motor Drive Parameters

The motor drive that is shipped with the frame will be programmed with the correct tuning parameters. If the drive is replaced, the values should be checked against the appropriate default values.
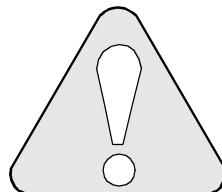
Failure to use the correct values will result in improper frame operation, burn the windings of the motor, or produce excessive torque.

Table 5-1 Motor Drive Parmeters

Code	Name	Controller Vendor Default Values	Scanning Platform Default Values	Smart U-Frame Values
Group 01: ACTUAL VALUES AND STATUS				
101	f_{ref}	(Info Only)	(Info Only)	(Info Only)
102	Last Fault	(Info Only)	(Info Only)	(Info Only)
103	Version	(Info Only)	(Info Only)	(Info Only)
Group 02: MOTOR VALUES AND LIMITS				
201	U_{nom}	230 V	230 V	230 V
202	f_{nom}	50 Hz	130 Hz	95 Hz
203	I_{nom}	2.2 Amp	1.1 Amp	1.1 Amp
204	Nom Speed	1440 rpm	1800 rpm	1800 rpm
205	I_{max}	3.3 Amp	2.5 Amp	2.5 Amp
206	f_{max}	50 Hz	120 Hz	120 Hz
207	f_{min}	0 Hz	0 Hz	0 Hz
208	Dir Lock	1	1	1
209	Motor Noise	0	0	0
Group 03: DRIVE CONTROL				
301	Stop	1	1	1
302	Ramp	0	0	0
303	Acc	5.0 sec	1.0 sec	1.0 sec
304	Dec	5.0 sec	0.5 sec	0.5 sec
305	U/f Ratio	1	1	1
306	IR Comp	10 VAC	15 VAC	15 VAC
307	DC Inj Time	0.0 sec	0.0 sec	0.0 sec
308	UC_{max} Control	1	1	1
Group 04: INPUT/OUTPUT				
401	Al min	0%	0%	0%
402	Al max	100%	100%	100%
403	Ref min	0 Hz	0 Hz	0 Hz
404	Ref max	50 Hz	120 Hz	120 Hz
405	DI Config	1	1	1
406	Const speed	5 Hz	5 Hz	5 Hz
Group 05: SUPERVISION				
501	Al Fault	0	1	1
502	f_{lim}	35 Hz	0	0
503	Param Lock	1	1	1

Note: Motor Drive assemblies shipped from Columbus, Ohio arrive preprogrammed with the standard Scanning Platform setup. For Smart U-Frames, the values for Codes 202 and 306 may need to be adjusted manually for different frame conditions.

Motor Controller Setup (ABB Drive)

The servo tuning variables, *vmin* and *Accel*, should be set up to fall within the following ranges:

vmin = 40% to 60% of the nominal scan speed

Accel = 20% to 40% of the nominal scan speed

Adjustment of these two variables will involve a compromise between developing a smooth start and stop of each scan and the ability to achieve fixed point positions such as Single Point, Standardize, and Off-Sheet. The issue at the fixed points will be not to oscillate before achieving position complete. For scanning , the issue will be a smooth exit and entrance from and to the scan limits. Keep in mind that the value of *vmin*, and ultimately *activeVmin*, should never exceed the nominal scan speed. In general, increasing the value of these variables will increase the instability at the fixed point locations.

Motor Controller Adjustment of IR Comp (menu 306)

1. With the *AI Comp* set to 20, place the Scanning Platform at the Off-Sheet position.

2. Mark the beam so can tell if the head moves in either direction.

3. Wait approximately five minutes to see if the head has moved from the mark.

4. If it has not moved, the task is done and the entered values can be saved using the ACS100 upload routine. If the head has moved, then decrease the value in 306 by 2 and redo Step 2. and Step 3.

Panel Operations

The panel display defaults to the Code 101 display of output frequency. Subsequent pressing of the UP/DN arrow push buttons will alternate the display between the output frequency and output current.

Moving Around the Menu

1. Press the MENU push button to show the menu group level of the last observed parameter value.

2. Press the DN arrow push button to get to lower menu groups. It is a rotating display buffer; so you will eventually get to where you want, even if you pick the wrong direction.

3. When you get to the group you want, press ENTER to move into the subgroup. The same rules apply within the subgroup.

4. At the desired subgroup, press ENTER to view the parameter value. Press and release quickly, and the value only displays for a moment. Press it for a few seconds, and the value will stay on the display.

5. Press MENU to get back to the submenu display.

Table 5-1 on page 72 shows the available menu selections.

LOCAL/REMOTE

The power-up default mode for the Motor Drive is REMOTE. All values can be observed in REMOTE. However, values can only be changed when the Drive is in LOCAL mode.

1. To put the Motor Drive in LOCAL, simultaneously press the MENU and ENTER push buttons. Note that the LCD shows the new mode.

2. To go back to REMOTE, simultaneously press the MENU and ENTER push buttons again.

Setting a Parameter Value

1. Go to the desired parameter menu location (see).

2. Set the MDPanel to show LOCAL mode.

3. Press the ENTER push button until SET is displayed.

4. Use the UP/DN arrow push buttons to adjust the parameter to the desired value. When the value is changed, the SET display will blink.

5. Return the MDPanel to REMOTE operations when done.

Downloading Parameters

This operation should only be used to program a new Motor Drive using an MDPanel which already contains the desired parameter values.

Note: Make sure the MDPanel shows the LOCAL mode.

1. Press the MENU push button to get to the group display.
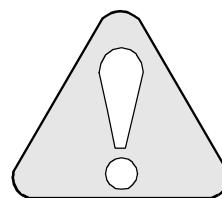
Do not execute the "-Fd-" menu selection. It will change the Motor Controller to the ABB Drives factory settings, not the settings established for ABB scanners.

2. Press the UP arrow push buttons until the display shows "-dL-".

3. Press and hold the ENTER push button until the display starts to blink. When the operation is complete, the display will revert back to the power-up display of output frequency (Hz).

4. Return the control panel to REMOTE operation when done.

Uploading Parameters

This operation is used to prepare a new Motor Drive Panel unit with default parameters from a Motor Drive that is known to have the correct operational parameters installed.

Note: Make sure:
1. The configuration switch (S1) on the motor controller is at zero (0).
2. The MDPanel is showing LOCAL mode.

1. Press the MENU push button to get to the group display.

2. Press the UP arrow push button until the display shows "-UL-".
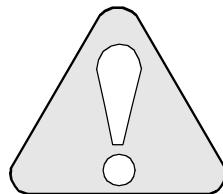
Do not execute the "-Fd-" menu selection. It will change the Motor Drive to the ABB Drives factory settings, not the settings established for the Smart Platforms.

3. Press and hold the ENTER push button until the display starts to blink. When the operation is complete, the display will revert back to the power-up display of output frequency (Hz).

4. Return the MDPanel to REMOTE operation when done.

Alarms and Fault Reporting

Table 5-2 Motor Drive Alarms and Faults

Code	Description
CF 0 - CF 9	Position of configuration switch S1. Certain parameters can be modified only when S1=0.
AL 1	Parameter upload/download failed.
AL 2	Operation not allowed while start is active.
AL 3	Operation not allowed in remote or local control.
AL 4	REVERSE button disabled. Parameter 208 (Dir Lock) is active.
AL 5	Panel START button disabled. DI configuration is three-wire and D12 is open.
AL 6	Operation not allowed. Parameter 503 (Param Lock) is active.
AL 10	Overcurrent controller active.
AL 11	Overvoltage controller active.
AL 12	Undervoltage controller active.
AL 13	Reserved. Contact supplier.
AL 14	Reverse command attempted in remote control (REM), while parameter 208 (Dir Lock) is active.
AL 15 - AL 16	Reserved. Contact supplier.
FL 1	Overcurrent: • Possible mechanical problem. • Acceleration and/or Deceleration times may be too small.
FL 2	DC overvoltage: • Input voltage too high. • Deceleration time may be too small.
FL 3	ACS 100 overtemperature: • Ambient temperature too high. • Severe overload.
FL 4	Fault current: output earth fault or short circuit
FL 5	Output overload.
FL 6	DC undervoltage.
FL 7	Analog input fault. See parameter 501.
FL 8	Motor overtemperature. See parameter 502.
FL 9	Panel disconnected from drive in local control. NOTE: If FL9 is active when the power is turned off, the ACS 100 will start in remote control (REM) when the power is turned back on.
FL 10	Parameters inconsistent. Check that Al min (f_{min}) is not greater than Al max (f_{max}).
FL 11*	DC bus ripple too large. Check supply.
FL 12	Reserved. Contact supplier.
FL 13 - FL 19*	Hardware error. Contact supplier.
Full display blinking	Serial link failure. Bad connection between the control panel and the ACS 100.

Note: Faults (*) with a red blinking LED are reset by turning the power off and on. Other faults are reset by pressing the START/STOP button.

Motor Controller Setup (Fincor and Lovejoy)

The direction and speed of the AC motor which drives the Scanning Platform, is managed by the motor controller, located in the end column of the Scanning Platform. The motor controller determines how much torque to apply when the head package encounters resistance.

At initial power-up, before head position calibration or tuning, the Scanning Platform will move at 50 percent of its maximum speed whenever the JOG push buttons are pressed. The maximum speed is determined by the FMAX adjustment on the motor controller and this speed is used when moving off–sheet from a position out on the scanner.

The motor controller will also affect the perceived tuning of the Scanning Platform. The actual velocity of the head package movement has a non-linear relationship with the output request of the Scanning Platform due to the dynamics of the motor controller. Any changes to the motor controller adjustment will require retuning of the software.

The procedure to correctly set up the motor controller requires you to manually adjust the motor controller and alter instance variables in the Scanning Platform software using the *ft* utility.

1. At the Service Workstation, run the *ft* utility by typing *ft* at the $$ prompt. The menu tree shown in Figure 5-1 on page 69 will help you find your way through the menu selections.

2. In the *ft* main menu, select MODIFY Values, selection 1.

3. Select Manual Servo Calibration, selection 6, from the MODIFY Values menu. The Manual Servo Calibration screen is shown in Figure 5-3.

```
      ***   MANUAL SERVO CALIBRATION   ***

Variable Name                   Description                 Current Value
 1: Accel                   Nominal acceleration.                   40.59
 2: vmin                    Minimum speed necessary to move head.    3.85
    activeVmin              Current minimum speed value in use.      3.85
 3: vmax                    Maximum allowed speed.                  40.55
 4: vdb                     Velocity deadband for DDC control.       1.00
 5: Kp                      DDC proportional gain term.             0.250
 6: Ki                      DDC integral gain term.                 0.010
 7: ddcExcessiveErrorPct    Excessive error percent for DDC control. 25.00
 8: ddcRestrictedMotionPct  Restricted motion percent for DDC control. 50.00
 9: vminTune                Vmin self-tuning algorithm active.        OFF
10: vminFilterFactor        Exp. filter factor for vmin self-tuning  0.33
11: MCslope                 Motor controller slope.                  0.09
12: MCoffset                Motor controller offset.                   18
13: MCjogCommand            DAC output for jogging the frame.         128
14: MCfastTuneDAC           Motor controller tuning FAST DAC output.  190
15: MCslowTumeDAC           Motor controller tuning SLOW DAC output.   80
16: xdb                     Position deadband for HOMING control.    0.95


 TO MODIFY A VARIABLE ENTER ITS NUMBER NOW
 (r to redisplay, q to quit, Q to exit):
```

Figure 5-3 Manual Servo Calibration Screen in ft.

4. Set the value for *MCjogCommand* to 128.

5. Mark two positions on the frame which are 150 cm (60 in.) apart.

6. Use the JOG push buttons to move the head between the marked positions, adjusting FMAX on the motor controller until the time to traverse the positions is between six and 10 seconds.

    For long frames (greater than 8 meters), the faster time may be required to successfully accomplish frame tuning.

7. Jog the head, adjust V/F so that the head can be manually stopped as it traverses without undue effort. Note that this is being done at the jog speed which is roughly 15 cm/sec (6 in./sec).

    Higher scan speeds will require more force to stop and lower scan speeds will require less force.

8. Manually force the head carriage to move from a stopped position.

9. Adjust the BOOST potentiometer so that significant force is required to make it move.

10. Ensure that the motor does not heat up when in the off-sheet position (too much boost can cause a stopped motor to overheat).

11. Exit the *ft* utility, type **q** and press RETURN when requested to save the variables changed in this procedure to the current **.ini** files.

Mounting Screws

Motor Controller Mounting Sled

(Controller Cover Removed)

Scanning Platform

Drive-side end column

Figure 5-4 Location of the Motor Controller in the SP End Column

ACCEL
(zero)

DECEL
(zero)

JOG
(zero)

BOOST
(Slow Torque)
(25% to 75%
of Max)
(see text)

V/F
(Motor Torque)
(Approximately
10% of max)

MCAL
(zero)

FMAX
(Max Speed)
(Approximately
50% of max)

Motor Controller Circuit Board

Figure 5-5 Adjustments to the Motor Controller

Basic Tuning

The basic tuning portion of Scanning Platform Setup will calibrate the position encoder and tune the controlling software (servo object) for the Scanning Platform drive motor.

Head position calibration will be achieved by entering a position measurement into the *ft* utility at the Service Workstation. The calibration utility will determine the measured position on the Scanning Platform.

The servo tuning is an automated routine that measures the response of the Scanning Platform to a series of velocity targets initiated by the controlling software. The servo software object is then calibrated to the response of the motor controller setup. The response is affected by the tuning of the motor controller hardware, so the Motor Controller Setup procedure must be performed before basic tuning.

This procedure requires you to jog the Scanning Platform head package and take one dimension measurement on the Scanning Platform and enter it at the Service Workstation. The automated master controller motor controller tuning portion of this procedure will move the head package to several positions on the Scanning Platform.

Before proceeding with this phase, make certain the Far Limit Switch has been mechanically adjusted to prevent the head package from hitting an obstruction, such as the machine ropes.

1. At the Service Workstation, start the *ft* utility by typing **ft** at the $$ prompt.
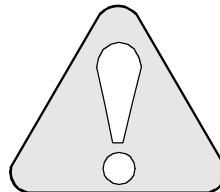
2. In the *ft* main menu, select MODIFY Values, selection 1.

3. Select Head Position and Motor Controller Calibration, selection 1, from the MODIFY Values menu.

   The *ft* utility will display the current tuning values as shown in .

```
***  HEAD POSITION CALIBRATION  ***

      The CURRENT head position slope is : 0.010000

      The CURRENT head position offset is : 1.725000

      The CURRENT scanner home travel limit is: 17.625000

      The CURRENT scanner far travel limit is293.075000


      This frame has auto edge of sheet (AEOS):
         The HOME edge detector offset is: 35.000000

         The FAR edge detector offset is: 19.500000


     Please enter the frame type or q to quit;
            1 for 700;
            2 for 1200 or Dual Rail U-Frame;
            3 for Single Rail U-Frame;
     Please enter the customer units for head position (1 = cm; 2 = inch; q to quit);2
```

Step 4

Figure 5-6 Head Position Calibration – Initial Display (Example)

4. Enter the frame type.

5. After selecting frame type, choose the units to be used for the head position calibration, as shown in Figure 5-6.

    Select 1 for centimeters, or select 2 for inches.

Note: Initially, the Scanning Platform is configured with the customer units defined as centimeters. If it is necessary to change the customer units to inches, all of the Scanning Platform dimension variables must be converted to inches.

6. When requested by *ft*, use the JOG push buttons to move the Scanning Platform head package to the home limit switch.

    The home side limit switch is activated when the scanning head will not jog further in the home end column direction.

7. Measure the distance from the home end column to the edge of the carriage wrap–around assembly as shown in Figure 5-7.

    Record the measurement in the customer units chosen in Step 4.
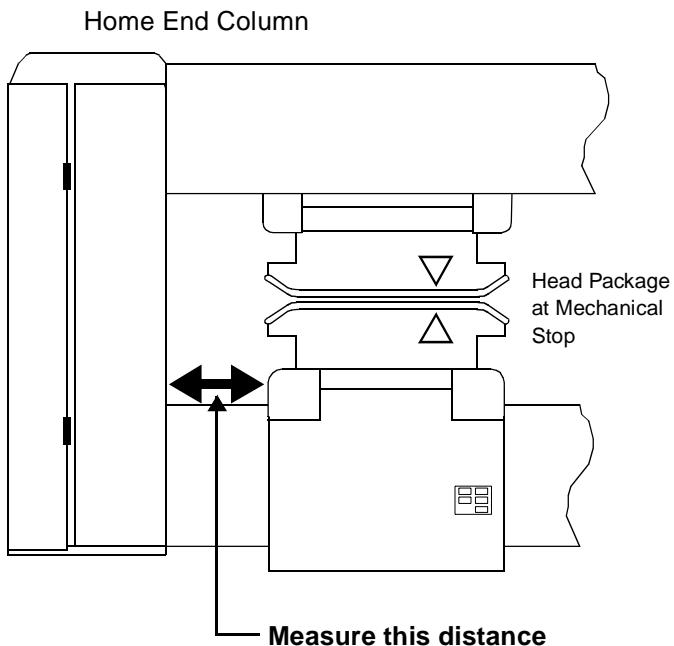
Home End Column

Figure 5-7 Head Position Calibration Measurement

8. When requested by the *ft* utility, enter the measurement taken in Step 7., as shown in Figure 5-8.

   The utility will display the computed value for the distance between the end column and the measurement window center line, based on the measurement entered. If the values do not seem reasonable, repeat this step.

```
Jog the frame to the HOME limit switch;
 PUSH the head against the mechanical stop and
   measure the wraparound carriage distance;              Step 7 - 8
   Enter the customer units value of this position => 5.25

NOTE:   The following measurements are with respect to the head center line
            The MEASURED home travel limit is   : 17.625000 units
                                                 : 1600.000000 counts
            The DESIRED home travel limit is    : 17.625000 units
 Do you wish to repeat the HOME limit setup? (y or n):n
```

Figure 5-8 Head Position Calibration Screen

9. The utility will ask whether you want to use automatic (a) or manual (m) determination of the far limit switch position. The preferred method is manual.

   In manual, you should first force the head into the far mechanical stop position after reaching the limit switch, then press RETURN.

   The utility will display the measured value, in customer units, of the current position of the head package, shown in Figure 5-8. If acceptable, press return. If the value does not seem reasonable, repeat this step.

   If automatic, jog the Scanning Platform head package to the far limit switch, using the JOG push buttons. When the head package has reached the limit switch, wait one second and then return the head to the home end and place in remote.

10. The utility provides the option of establishing a process centerline point. The utility will then ask if you want to use the machine centerline to determine setup. For all but aseptic applications, you should answer no (n). The process centerline setup enables the system to establish reasonable scan limits and speed apart from further setup and control by a host computer. A "no" (n) answer advances you to the next step. A "yes" answer (y) answer asks you to jog the head to the position on the platform which represents the centerline of the process. Then, press the RETURN key. In either case, a final summary of the head position calibration procedure will be displayed as shown in Figure 5-9.

11. To save the head position calibration values determined in this procedure, press RETURN when prompted by the utility as shown in Figure 5-9. There is a separate prompt for **io.ini**, **frame.ini**, and **appl.ini**.

   The new calibration values will be saved to the current **.ini** file so that they will be available when the Scanning Platform is restarted.

   Since the head position calibration tuning has been changed, it is necessary to reload the Host computer head positions with the Scanning Platform, by using the **PMMRLD** command.

```
      The NEW head position slope is : 0.010000
      The new head position offset is: 1.625000
      Scanner's home travel limit has been changed to 17.625000 units.
      Scanner's far travel limit has been changed to 293.145000 units.
      Scanner's maximum speed has been changed to 15.891772 units.
      Scanner's on-sheet speed has been changed to 5.959414 units.
      PmmFrame has been recalibrated to new max limits.
      Servo's minimum speed (vmin) has been changed to 0.720715 units.
      Servo's maximum speed (vmax) has been changed to 15.891712 units.
      Servo's maximum acceleration (Accel) has been changed to 4.592000 units.
      Servo's position deadband (xdb) has been changed to 0.639990 units.
      EdgeDetector's directional hysteresis has been set to: 0.160000 units.

Enter new file path name OR
(ret) to save to "/ss01/clm/frame.ini" OR
"q" to quit.
=>
Frame graph was successfully saved to file "/ss01/clm/frame.ini".

Enter new path name OR
(ret) to save to "/ss01/clm/io.ini" OR
"q" to quit.
=>
Enter the new file path name OR
<ret> to save to "/ss01/clm/appl.ini" OR        Step 10
"q" to quit.
=>

 NOTE: Successful completion of head position calibration
         requires (re)calibration of the Motor Controller;
         This function will be performed next...
```

Figure 5-9 Head Position Calibration Summary Display

> Note: Make sure the head is near but not on the Home Limit Switch prior to Step 12.

12. Press RETURN to continue or press **a** to abort.

    If return is selected the system will respond with the message

    ```
     ***     AUTOMATIC SERVO CALIBRATION     ***
    ```

13. The system will display the following message:
    ```
    Motor controller tuning will cross the sheet edges, do you
    wish to continue? (y or n)
    ```
    (If a sheet break is present, this step will be skipped.)

Note: If the head crossing the sheet edge will create a problem, abort the procedure. Wait until there is a sheet break before proceeding.

```
      ***       AUTOMATIC SERVO CALIBRATION     ***

The following servo tuning changes are being implemented:
    Motor controller slope of    0.139 is being changed to   0.139
    Motor controller offset of      10 is being changed to     11
    Servo minimum speed of        0.721 is being changed to   0.989
    Servo maximum speed of       15.892 is being changed to  15.801
    Scanner maximum speed of     15.982 is being changed to  15.801
                                                                         Step 13
Enter new file path name OR
(ret) to save to "/ss01/clm/frame.ini" OR
"q" to quit.
=>
Frame graph was successfully saved to file "/ss01/clm/frame.ini"

Carriage return to continue...
```

Figure 5-10 Motor Controller Servo Calibration Summary

14. Place Frame Control in Remote and press RETURN to continue.

    The Motor Controller Tuning screen will be displayed, as shown in the example in Figure 5-11.

    The scanning carriage will move in the off-sheet direction and search for its home position. It will then begin a series of movements across the Scanning Platform, taking velocity and distance measurements at certain times. After approximately 30 seconds, the utility will finish the motor controller calibration.

    You can terminate the Automatic Controller Tuning at any time by typing **"a"** at the keyboard, or placing the Scanning Platform in LOCAL control at the control panel.

Note: On scanners less than 2.5 meters long, it may be necessary to reduce the SLOW and FAST JOG DAC outputs to keep the head from tripping the far travel limit switch during the motor controller tuning.

15. When motor controller tuning is complete, the utility will display a banner across the middle of the display. The display prompts you to accept the tuning results, "**y**" or "**n**". Answer "**y**" unless the new slope and offset values seem incorrect. A summary of the new motor controller calibration values is shown in Figure 5-11.

16. In order to fully implement the head position calibration procedure, it will be necessary to restart the Scanning Platform as a final step. To do this, exit the *ft* utility and type *reset* at the $$ prompt.

17. Establish a correct minimum velocity.

    Because of the action by the servo to keep increasing the output until there is movement, it is not likely that there will be situations where the head will

actually stall. *activeVmin* is only changed if the *vminTune* flag is set. Making sure that the system has established a reasonable *activeVmin* before turning off the *vminTune* flag is important because it allows the servo HOMING action to proceed quicker if a more correct starting point is used. Once a reasonable *activeVmin* has been established, the value should be written into the *vmin* field and saved using the **gstore** utility. This will establish the correct *activeVmin* at the next system restart.

```
     Carriage return to continue or "a" to abort...
                          "a" to Abort      [  MOTOR CONTROLLER TUNING  ]
                      DAC     Event   Forward     Forward    Reverse     Reverse
                     Output  Duration  Time Of    Position   Time Of    Position
Start                  80    5.000   12093.015      12339
Accelerate Slow        80    1.000
Slow Sample One        80    1.000   12095.016 [1]  13677    0.000 [5]      0
Slow Sample Two        80   12.000     0.000 [2]      0      0.000 [6]      0
Accelerate Fast       190    1.000
Fast Sample One       190    1.000     0.000 [3]      0      0.000 [7]      0
Fast Sample Two       190    4.500     0.000 [4]      0      0.000 [8]      0
TurnAround            190    1.000
Fast Stop             190    1.000   Old Slope    0.087   New Slope    0.000
Decelerate Slow        80    1.000   Old Offset     18   New Offset       0
 |-----------------------------------------------------------------------|
 |          >                                                            |
 H O   h--------------------------------------------f                    F
 Tuning State       CRUISING_SLOW_FORWARD_TO_SAMPLE_TWO        Timer   3.000
 Current:        Time 12098.016  Position  15720 FORWARD    DAC       80
 Initialization: Time 12087.619  Position   9017   Elapsed Time  10.397
 Motion Threshold Time    99.900  Counts     100
 Motion:          Timer   10.400  Detected  FALSE
 Positions:       H =   3430 O =   9057 h =  12078 f =  42291  F =  54725
 Limits:          Reverse FALSE    Forward   FALSE
```

Figure 5-11 Automatic Motor Controller Tuning Screen

18. To use the motor controller calibration values determined in this procedure, press RETURN when prompted by the utility, as shown in Figure 5-10. The new calibration values will be saved to the current **.ini** file so that they will be available when the Scanning Platform is restarted.

The **ft** utility will return to the MODIFY Values menu

Head Position Setup

This section defines specific head position locations. See Figure 5-12. The position variables are listed below.

Garage Position (OFF)

The Garage Position is the position on the Scanning Platform, next to the process, where maintenance is performed. The entered distance should be the smallest of the Host positions, as measured from the home end column.

If personal safety and service access needs dictate, it is possible to place the off–sheet position adjacent to the far column end of the platform. In this case, leave the standardize position at the home end if possible and note that when going on-sheet, the heads will traverse the entire platform length from the far end to the home end in order to start its scan.

Standardize Position (STDZ)

The Standardize Position is the position where sensor standardization occurs. This position typically is the same as the off sheet position and should never be close enough to the sheet edge so that the far edge detector sees the sheet edge. The entered distance should be less than the value for the Minimum Home EOS Position.

Normally the off-sheet and standardize positions are identical because this allows the automatic check sample sequence to be extended after standardize without moving the head to a new position and enhances accuracy.

Minimum Home Measure Position (LHEOS)

This position defines the home position of the maximum scan width, and the minimum limit for the Current Home Scan Limit. The Scanning Platform will never scan outside of the minimum measure position. This value should be greater than those for the Garage Position and the Standardize Position. This position is called the Home Measure Limit.

Current Home Scan Position (KHEOS)

This position is the current home side scan limit for the present sheet width. This value will never be less than the Minimum Home Measure Position. This position is called the Home Scan Limit.

## Default Single Point Position (SPPOS)

This is the default single-point measurement position, when the Scanning Platform is placed in the single-point mode. The entered value must be between the Current Home Scan Position and Current Far Scan Position.

Current Far Scan Position (KFEOS)

This position is the current far side scan limit for the present sheet width. This value will never be greater than Maximum Far Measure Position. This position is called the Far Scan Limit.

Maximum Far Measure Position (LFEOS)

This position defines the far position of maximum scan width, and the maximum limit for Current Far Scan Limit. The Scanning Platform never scans outside of the Maximum Measure Position. This position is called the Far Measure Limit.
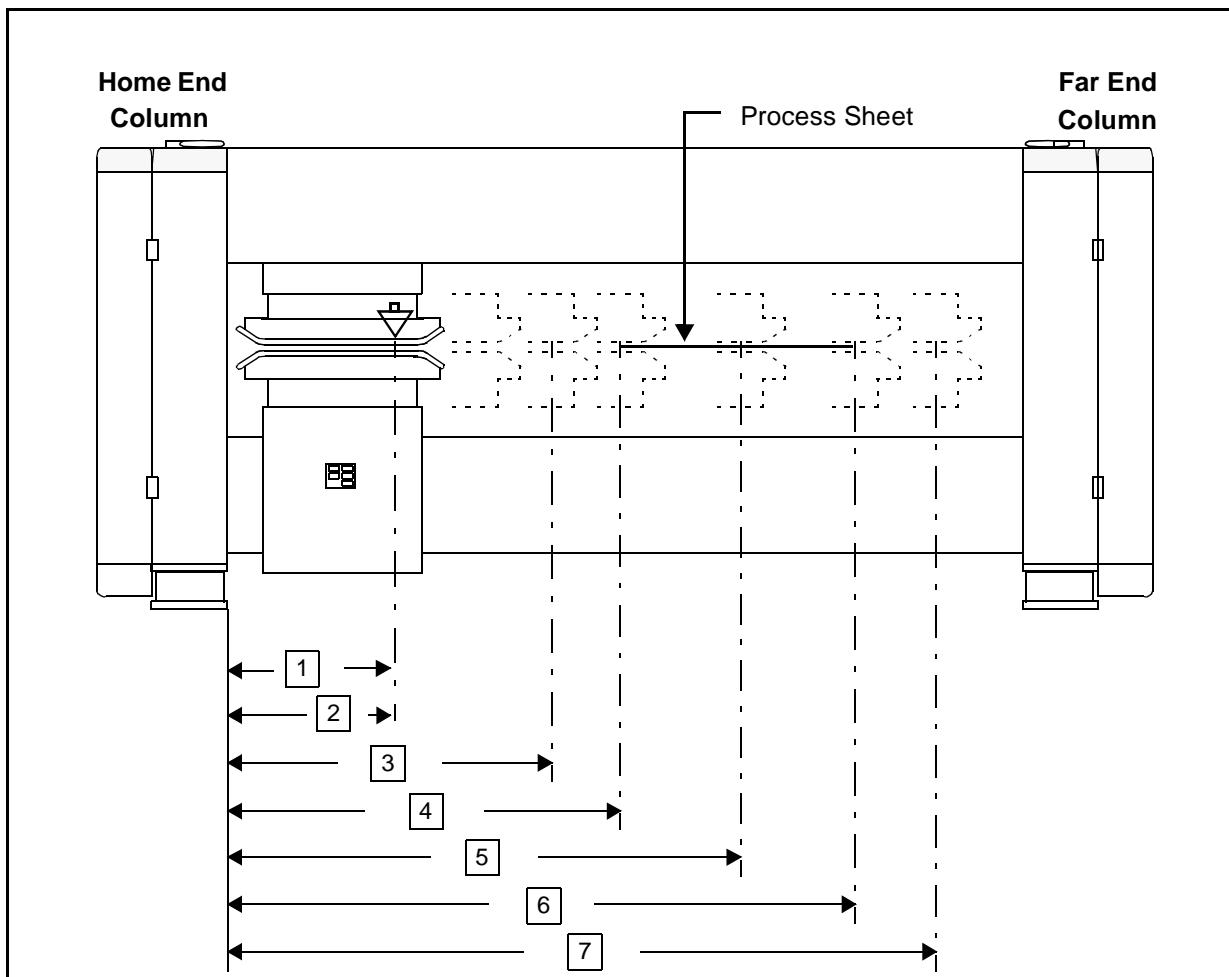
Figure 5-12 Scanning Platform Positions at the Host Computer

1. Garage Position   (OFF)
2. Standardize Position   (STDZ)
3. Minimum Home Measure Position   (LHEOS)
4. Current Home Scan Position   (KHEOS)
5. Default Single Point Position   (SPPOS)
6. Current Far Scan Position   (KFEOS)
7. Maximum Far Measure Position   (LFEOS)

Notes about LHEOS and LFEOS (Scanning Measurement Limits)

The variables LHEOS and LFEOS define the sheet's measure limits at the maximum possible trim positions of the process. This then defines the farthest positions which the measurement heads can achieve during scanning operations. As a result these variables define the width and location of all system databoxes.

On multi-frame applications, all frames must be identically aligned with respect to the physical process. Since sheet shrinkage is a very nonlinear function, it is not recommended that any attempt be made to compensate for shrinkage by misaligning the frames. Proper compensation for sheet shrinkage can only be accomplished via algorithmic means. See Figure 5-13.
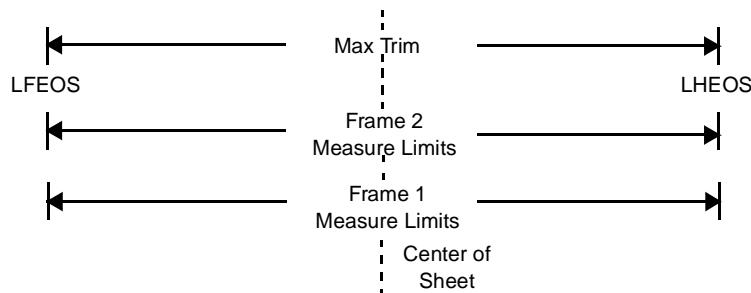
Figure 5-13 Limits for Multiple Platform Installations

Procedure for LHEOS and LFEOS

1. Determine the physical center line of the **process** relative to the Headbox at each frame location. Note that the center line of the rolls in any area of the machine may not be the center line of the process.

2. The maximum trim locations should be determined by measuring equal distances from the center line determined above to each edge of the possible sheet run.

3. JOG or otherwise move the head package until the center line of the sensing windows is directly aligned with each of the maximum trim locations determined above. Permanently mark the frames to identify the maximum trim locations. These marks will make it easier to check or set up these locations during maintenance operations.

4. Record the head position while the head package is at each of the marked locations. Enter the recorded position into LHEOS and LFEOS, as specified for your system.

Procedure for Determining Position Values

Mark the locations of the machine center line, the Minimum Home Measure Position, and the Maximum Far Measure Position on the Scanning Platform for future reference.

Note: If you have trouble using the Jog push buttons on the Scanning Platform control panel because the system is too responsive, slow down the jog speed using the Frame Health Report.

1.   Select the Frame Health Report. If necessary, refer to "Operation of NT Workstation Health Reports" on page 112.

2.   Use the JOG push buttons on the Scanning Platform end column to move the head package to the desired position.

3.   Record the current head position as displayed on the Health Report.

4.   Repeat Steps 2. and 3. for each of the fixed frame positions.

5.   Enter values in customer units in the appropriate data fields of the Health Report. See Figure 5-14.

6.   Remember to do a *gstore* to make changes permanent.

Figure 5-14 NT Workstation Frame Health Report - Scanner Setup

Head Package Dimensions Setup

The sensor head package dimensions are used to control the orientation of the window over the sheet as the head moves through its various sequences. The variables used for this purposes can be manipulated to accomplish a variety of head behavior patterns as the head moves from off–sheet to a scanning condition. This section contains information about the locations of these variables and a procedure for determining their values. The head package dimensional variables are defined below. Two basic equations deal with bringing the head on–sheet, depending whether auto edge of sheet is turned on or not:

Auto Edge of Sheet Turned Off:

Prepare to measure position = homeScanLimit + homeHeadClearance − homeWindowClearance + curlDist + positioningSafetyFactor

Auto Edge of Sheet Turned On:

Prepare to measure position = homeEOS + homeHeadClearance + curlDist + positioningSafetyFactor

Definition of Head Package Dimensions

Table 5-3 Head Package Dimensions

homeHeadClearance	This variable represents the distance between the home–side edge of the sensor head package and the measurement center line. Its value will depend on how far beyond the home edge of the sheet the head must come before starting the Prepare To Measure activity. In any event, it must always be larger than the *homeWindowClearance*.
farHeadClearance	This variable represents the distance between the far–side edge of the sensor head package and the measurement center line. The variable only comes into play when the head must enter the prepare to measure position from the far side of the scanner. In that case, it will have the same function as the *homeHeadClearance*. When it is used, it must be larger than the *farWindowClearance*.
homeWindowClearance	This variable represents the distance, on the home–side of the head package, from the measurement center line to the edge of the largest sensor window in the head package. The window radii will range from approximately 0.5 in. for a Smart Ash sensor to 2.5 in. for a HemiPlus sensor (see Figure 5-15).

(continued on next page)

Platform Tuning

Table 5-3 (continued)

farWindowClearance   This variable represents the distance, on the far–side of the head package, from the measurement center line to the edge of the largest sensor window in the head. The window radii will range from approximately 0.5 in. for a Smart Ash sensor to 2.5 in. for a HemiPlus sensor (see Figure 5-15).

curlDist   This variable represents the additional distance that the heads will travel when first coming on–sheet to the prepare–to–measure position to assure that sheet contacting sensors, such as caliper, are fully on–sheet before making contact. The heads will then back up to the Current Home EOS Position to start scanning. If desired, the entire prepare-to-measure positioning can be accomplished with the *homeHeadClearance* dimension, leaving the curlDist at its default value of 0.1 units.

positioningSafetyFactor   This variable represents the additional distance that the heads will travel when first coming on-sheet to the prepare-to-measure position to assure that sheet contacting sensors, such as caliper, are fully on-sheet before making contact. The head will then back up to the current *homeScanLimit* to start scanning. If desired, the entire prepare-to-measure positioning can be accomplished with the *homeHeadClearance* dimension, leaving the *curlDist* at its default value of 0.1 units.

The locations of these positions on a Scanning Platform sensor head package are shown in Figure 5-15.
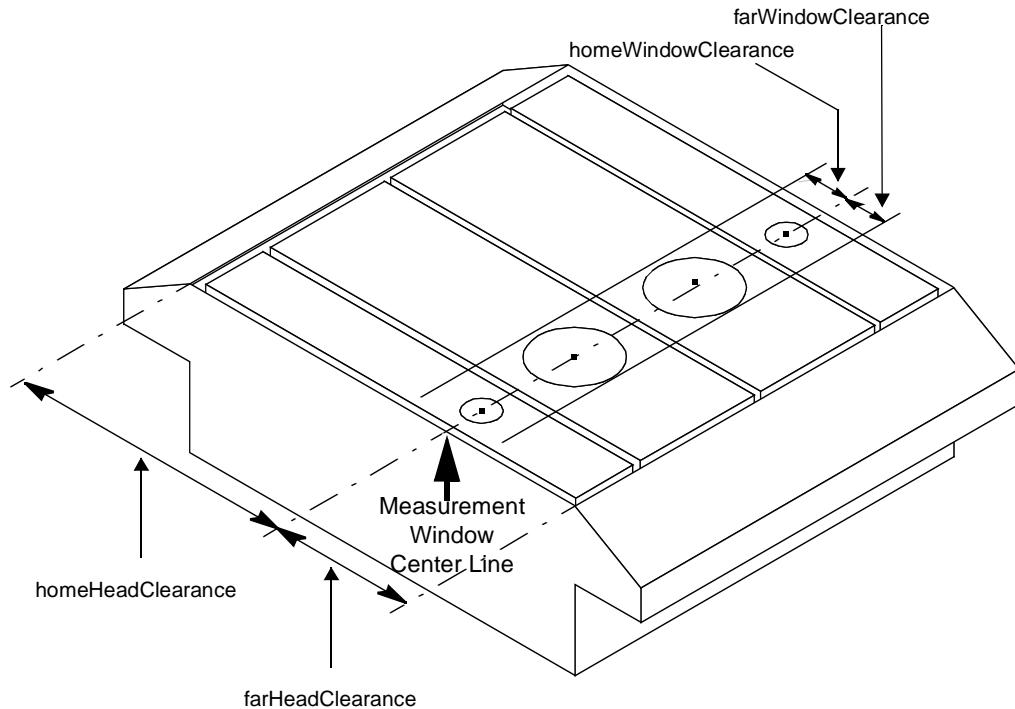
Figure 5-15 Location of Head Package Measurements

Determining and Entering the Head Dimensions

Refer to Table 5-4 on page 96 and Figure 5-14 on page 91.

1. Split the sensor heads, using one of the head split switches. Head split switches are located in the drive end and idler end columns.

2. Measure and record the *homeHeadClearance* and the *farHeadClearance* (in customer units) from the Scanning Platform head package.

3. Enter the values for *homeHeadClearance* and *farHeadClearance* into the Frame Health Report. Refer to Figure 5-14.

   homeHeadClearance and *farHeadClearance* assist the servo in making sure the head is sufficiently inside the sheet before measuring. These dimensions can be adjusted instead of *curlDist* to suit a desired head position during Prepare to Measure operations.

4. Determine the values for *farWindowClearance* and *homeWindowClearance* from Figure 5-15 on page 94. Table 5-4 on page 96 gives typical measurement area diameters for each sensor.

5. Divide the value for the largest sensor beam diameter by 2 to get the *farWindowClearance* and *homeWindowClearance*.

6. Enter the resultant number into the HEAD SETUP section of the Frame Health Report. Refer to Figure 5-14.

7. Exit the Health Report program.

8. Use the ***gstore*** procedure to save the changes made on the Frame Health Report.

Note: The diameters given in Table 5-4, define the nominal dimensions of the various sensor measurement beams. Each sensor has its own unique tolerance characteristics as the beam encroaches over a sheet edge. These characteristics will govern, in part, how close the measurement centerline may be brought to the sheet edge. For example, a GT Caliper probe may not go beyond the edge. On the other hand, a HemiPlus IR beam can be as much as halfway over the edge. Check each sensor's technical manual for that sensor's tolerance.

Table 5-4 Sensor Window Diameters

Sensor Type	Sensor Model	Measurement Beam Diameter	
		in.	cm
Basis Weight	TLK-5	2.1	5.33
	TLK-8	2.1	5.33
	TLK-9	2.1	5.33
	TLS-1	2.5	6.35
	TLP-1	1.0	2.54
	STLK*	0.59	1.5
	STLP*	0.59	1.5
IR Moisture	MIR-212	2.5	6.35
	DIR-212	2.125	5.40
Microwave Moisture	any	--	--
Ash	TLXR	1.0	2.54
	STLXR	0.59	1.5
Caliper	any	2.0	5.08
Gloss	any	--	--
OptiPak	any	--	--
Smoothness	any	--	--

*Cross Machine Direction Only

Automatic Edge-of-Sheet

The Automatic Edge-of-Sheet (AEOS) option available on the Scanning Platform allows the sensor head package to closely track the edge of the process sheet, and to respond to changes in the width of the process sheet. AEOS is made possible by mounting an infrared detector on the home and far edges of the head package.

This section contains guidelines for the setup of AEOS and a procedure for entering the values in the Scanning Platform.

The variables necessary for set up of AEOS are described below.

maxEdgeChange	This variable represents the maximum amount the sheet edge position is allowed to change before interpreting the edge change as a sheet break. All edge changes which are within this value, but greater than *EOSDeadband* are considered valid and sent to the Host computer.
EOSDeadband	This variable represents the distance the sheet edge is allowed to wander before a valid edge change to the Host is triggered.
homeEdgeTrack	This variable represents the target distance from the home edge of the window in the head package to the home edge of the sheet. See note on
farEdgeTrack	This variable is the target distance from the far edge of the window in the head package to the far edge of the sheet. See note on .
homeDetectorOffset	This variable is the distance from the measurement window center line to the center of the home edge sheet detector.
farDetectorOffset	This variable is the distance from the measurement window center line to the center of the far edge sheet detector.
allowSecondEdgeErrMsg	This variable is designed to allow or disallow an error message in "pe" when the far edge detector sees a threading rope which is close to the far sheet edge. If the flag is set to a **1**, then the system will report that it has found a new edge. If the flag is set to a **0**, its normal default value, the system will assume the new edge was a threading rope and ignore the occurrence. If the system performance requires that the far edge detector see the threading ropes in order to get close to the sheet edge, this flag should be set to 0.
allowEdgeOutsideLimits	This variable is used to permit the ignoring of false home edge detection while the head is coming on-sheet. This situation may occur on a Scanning Platform Reflection Scanner when there is a piece of the paper machine structure which can be seen by the edge detectors while coming on-sheet. For this to be effective, the actual edge of the sheet must be at a distance from the interfering structure that is at least the separation between the two edge detectors. This flag is defaulted to a **1**, which will make the head acknowledge the false edge, and if it is outside the *homeMeasureLimit*, will position the window centerline so that is is just inside the *homeMeasureLimit*. By making the flag a 0, the detectors will ignore the false edge and proceed to the predefined prepare to measure position.

These measurement relationships are shown in Figure 5-16.

Home Edge of Sheet   **Far Edge of Sheet**

EOSDeadBand   *EOSDeadBand*

or   *or*

maxEdgeChange   *maxEdgeChange*

homeEdgeTrack   *farEdgeTrack*

SENSOR HEAD PACKAGE   SENSOR HEAD PACKAGE

Edge Detectors

Edge Detector   Edge Detector

homeDetectorOffset   *farDetectorOffset*
(L1)   *(L2)*

Measurement Window Center Line   Measurement Window Center Line

Sheet Width
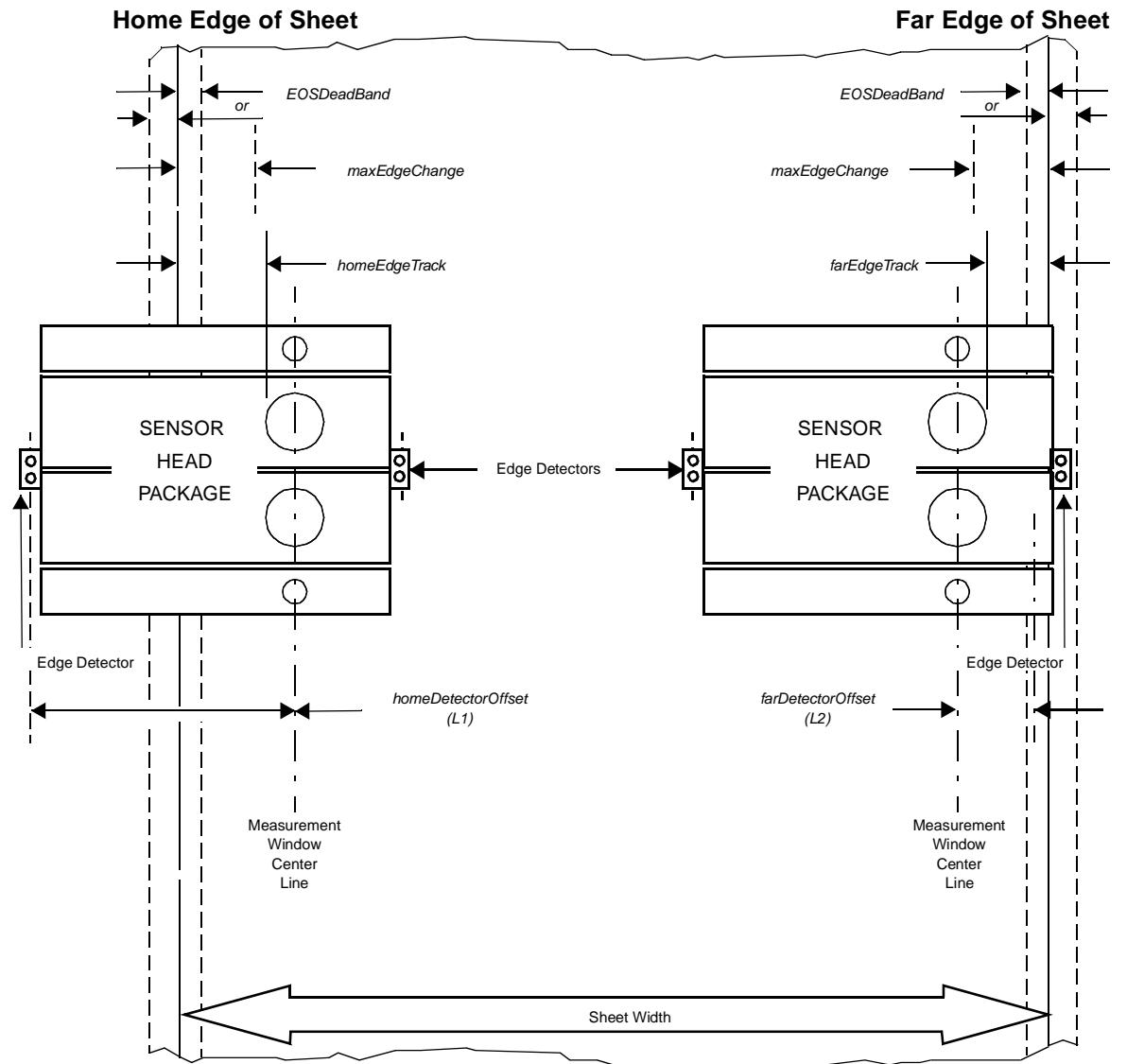
Figure 5-16 Automatic Edge-of-Sheet Position Measurements

Setup Guidelines

When the Scanning Platform scans near an edge, the scan limits will change only if the projected new scan limit will be outside the *EOSDeadband* value of the current scan limit.

It is important that all of the setup parameters be entered in the same customer units.

Do not make either *homeEdgeTrackingDistance* or *farEdgeTrackingDistance* smaller than the value for *xdb* located on the Frame Health Report. If either of these tracking variables is made too small, the Scanning Platform may position part of the window off the sheet edge, resulting in an increase in the dwell time at the edges. As the EOSDeadband is made smaller, the Scanning Platform will report a larger number of scan limit changes.

The relationship between the calculated scan limits and the detected edges is as follows:

homeScanLimit = homeEOS + farWindowClearance + farEdgeTrackingDistance + EOSDeadband
farScanLimit = farEOS - farWindowClearance - farEdgeTrackingDistance - EOSDeadband

The tracking distance variables should be set such that the scan limit positions allow the edge detectors to see the sheet edge. If the tracking distance is larger than the detector offset value, the head will not move smoothly at the sheet edge. In general, the tracking distances should meet the following inequality:

(Detector Offset - Window Clearence) > (Tracking Distance + EOSDeadband + xdb)

Entering AEOS Setup Parameters

Based on the previous guidelines, the following procedure will show how to enter the AEOS setup values into the Scanning Platform, using the **ft** utility.

The values for *homeDetectorOffset* and *farDetectorOffset* can be measured on the head package. The other values must be based on the desired performance of the AEOS feature.

1. At the Service Workstation, access the Frame Health Report. See .

2. Enter values, in customer units, for the following variables:

   AEOS State
   Home Det Offset
   Far Det Offset
   EOS Deadband
   Max Edge Change
   Home Edge Track
   Far Edge Track

3. Reset the microcontroller to activate the changed offsets.

   Use the command: *uc_reset -f 0x1f*

4. After about 30 seconds, put the platform in remote mode to synchronize the encoder.

5. Put the platform in the on-sheet mode to resume normal operation.
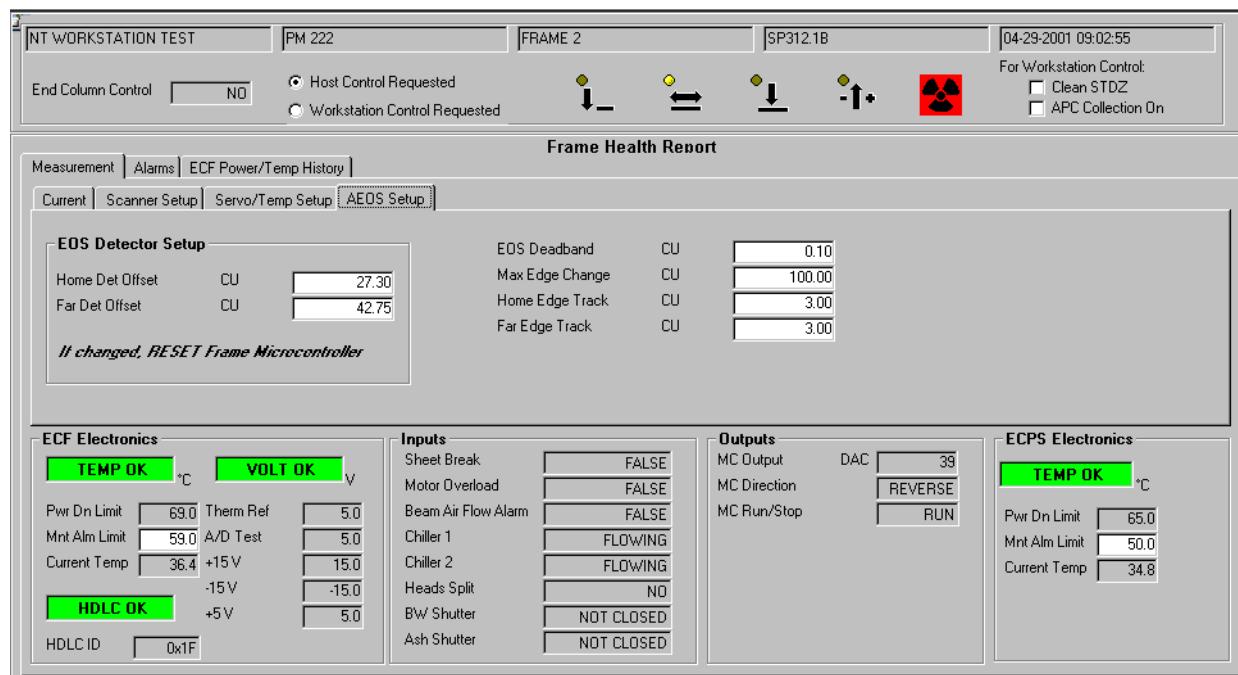
Figure 5-17 NT Workstation Frame Health Report - AEOS Setup

Motion Restriction Sensitivity

The Scanning Platform can be set up to respond with varying degrees of sensitivity to conditions which prevent or impede movement of the head package.

When the restriction exceeds the defined sensitivity, all drive output ceases and sensor shutters are closed until corrective action can be taken to clear the condition. An error message is also sent to the Host computer to notify it of the condition.

The desired sensitivity will depend on the setup of the motor controller and the site requirements for stopping the head package when an obstruction is met.

Obtaining the correct sensitivity is a matter of adjusting two parameters: *ddcExcessiveErrorPercent*, which has an inverse relationship to sensitivity, and *ddcMotionRestrictionPercent*, which has a direct relationship to sensitivity. Table 5-5 lists the sensitivity parameters and examples of values to reach desired sensitivities. Any value between 0 and 100 may be used. Experimentation will determine the best values for the site.

Table 5-5 Example of Motion Restriction Sensitivity Values

	Desired Sensitivity			
	low	**medium**	**high**	**default**
ddcExcessiveErrorPercent	95	90	80	100
ddcMotionRestrictionPercent	5	20	50	0

Note: Motor drive response to restrictions is also influenced by the motor controller pot adjustment for torque. High settings of the boost and V/F adjustments will alter the values given in Figure 5-18 on page 102.

Changing the Motion Restriction Sensitivity

Choose the desired sensitivity from Table 5-5 on page 101. The values can be entered by using the Frame Health Report. See Figure 5-18.

Figure 5-18 NT Workstation Frame Health Report - Servo/Temp Setup

Standardize Off-Sheet Delay Setup

At times there are large temperature differences between the off-sheet position and where the head package is over the process. These temperature differences can cause measurement problems if the head has been off-sheet long enough to cool. Under this situation, it is not appropriate to initiate a standardize before going back on-sheet, as this will introduce errors to the measurement due to standardizing with a cooled sensor package. To overcome this potential error, release SP280.2 introduces a feature which will delay the standardize if the head has been off-sheet for more than a specified amount of time. In this case, the head will forego any scheduled standardize until such time as a prescribed time on-sheet has been accomplished. During this time delay, the measurements will be valid provided there was an initial good standardize.

There are four instance variables located in the **scanner01** object associated with this feature. Two are setup variables, *offSheetTime* and *onSheetTime*, while the other two, *stdzRequested* and *stdzDelayRequired*, are status flags used to identify the current status of any standardize delay. The default condition for *offSheetTime* and *onSheetTime* is a 0. This will turn off the feature. Any non-zero positive value (time in seconds) in these two variables will activate the feature. The values used will necessarily be site and installation specific, depending on the temperature environment surrounding each frame. Experiment to determine the correct off- and on-sheet delay times.

This feature is primarily beneficial for the Caliper and OptiPak sensors and on Off-Machine Coaters where standardize should be delayed after machine startup. Other sensors may also benefit where on and off-sheet temperature differences are considered large. Unless large temperature differences are present, turn off the feature if a Caliper or OptiPak sensor is not present in the configuration. However, if it is on, it will control the standardize of all sensors in the system.

1. Activate the *inspect* utility.

2. Enter the desired off-sheet time in seconds:

   scanner01 -> offSheetTime = xxxx (0 = off)

3. Enter the desired on-sheet time in seconds:

   scanner01 -> onSheetTime = yyyy

4. Exit the *inspect* utility by typing: **:q**

5. Save the changes to the frame community using the *gstore* utility.

Operation Overview

When the head is moved off-sheet, a timer is started. When the time accumulation equals that of the **offSheetTime** value, the system will set the **stdzDelayRequired flag**. If a DIRT standardize request then comes from the host, the standardize request will be so noted in the **stdzRequested** flag, but the actual standardize procedure will be delayed until on-sheet has been requested and the head has been over the sheet for at least **onSheetTime** seconds. Note that a single point request will start the on-sheet timer, but the standardize will not occur until the mode changes back to scan or off-sheet.

Platform Tuning

Other Host Setup Procedures

The Host computer has several other important parameters that must be entered to assure proper operation of the measurements system including the following:

- Scanning time, typically takes 15-30 seconds

- Number of profile points, typically takes 100-600

- Standardize interval, typically takes 30-120 minutes

- Product code slopes, offset, compensations, and IR 4-filter flag

- Composite profile filter factor

- Requests for report printing

- Trend graphing of measurement and standardize results

Please refer to the appropriate system manuals for details.

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6

Measurement Setup

Measurement setup consists of a set of procedures that involve both the sensor and the Scanning Platform. Specific sensors have additional hardware setup procedures that are located in the specific sensor manuals. Refer to the Setup Checklists for the setup procedures sequence for each sensor.

This chapter contains the following major sections:

Setup Checklists

Newer sensor manuals may address all these sensor setup activities in more detail. Always review your sensor manual for information which may supersede the contents referred to here.

Basis Weight Sensor Setup

Table 6-1 Basis Weight Sensor Setup

Procedure	Refer To
Align the Sensor Heads	page 44
Set up the Temperature/Air Flow	page 115
Enter the Head Constants	page 122
Set the Standardize Limits	page 132
Verify the Sensor Function	page 146
Setup for Correct Ream Size	page 120
Air Temperature Compensation	page 148
Air Profile Compensation	page 152

IR Moisture Sensor Setup

Table 6-2 IR Moisture Sensor Setup

Procedure	Refer To
Align the Sensor Heads	*HemiPlus Moisture Sensor Manual, 3BUS 208 117 RXX01*
Set Up Cooling Unit	page 57
Adjust the Air Wipes	*HemiPlus Moisture Sensor Manual, 3BUS 208 117 RXX01*
Enter the Head Constants	page 122
Set the Standardize Limits	page 132
Verify the Sensor Function	page 146
Setup Default Compensation	page 156

OptiPak Sensor Setup

Table 6-3 OptiPak Sensor Setup

Procedure	Refer To
Align the Sensor Heads	*OptiPak Sensor Manual, 3BUS 208 121 RXX01*
Air Pressure Verification	
Calibration of the Head Constants	page 122
Set the Standardize Limits	page 132
Verify the Sensor Function	page 146
Set Up the Air Profile Compensation	page 152

Ash Sensor Setup

Table 6-4 Ash Sensor Setup

Procedure	Refer To
Align the Sensor Heads	page 44
Set up the Temperature /Air Flow	page 115
Verify Source High Voltage Supply Power–up and Adjustment	For STLXR3, refer to *Smart Ash Sensor Manual, 3BUS 208 128 RXX01* For TLXR3, refer to *2–Component and 3–Component Ash Sensors Manual, 3BUS 208 120 RXX01*
Enter the Head Constants	page 122
Set the Standardize Limits	page 132
Verify the Sensor Function	page 146
Setup Default Compensation	page 156

Gloss Sensor Setup

Table 6-5 Gloss Sensor Setup

Procedure	Refer To
Align the Sensor Heads	*Gloss Sensor Manual, 3BUS 208 122 RXX01*
Adjust the Air Wipes	
Filter Regulator Assembly	
Air Supply Quality Verification	
Enter the Head Constants	page 122
Set the Standardize Limits	page 132
Verify the Sensor Function	page 146
Set up the Air Profile Compensation	page 152

Apparent Density Setup

Table 6-6 Apparent Density Setup

Procedure	Refer To
Set up for Correct Density Units	page 110

Caliper Sensor Setup

Table 6-7 Caliper Sensor Setup

Procedure	Refer To
Power Checks	
Caliper Filter Regulator Assembly	*Contacting Caliper Sensor Manual, 3BUS 208 119 RXX01*
Air pressure Verification	*Caliper Sensor Technical Manual with FirstSight Technology, 3BUS 208 149 RXX01*
Align the Sensor Heads	*Non-Contacting Caliper Sensor Manual, 3BUS 208 131 RXX01* *Smart Caliper GT Sensor Manual, 3BUS 208 132 RXX01*
Set Up the Temperature Controller	page 115
Enter the Head Constants	page 131
Set the Standardize Limits	page 132
Verify the Sensor Function	page 146
Set Up the Air Profile Compensation	page 152
Set Up for Correct Units (Mils/ Microns)	page 121

Sheet Temperature Sensor Setup

Table 6-8 Sheet Temperature Sensor Setup

Procedure	Refer To
Align the Sensor Heads	*Sheet Temperature Sensor Reference Manual, 3BUS 208 123 RXX01*
Air Purge	
Power Checks	
Calibrate and Enter the Head Constants	
Set the Standardize Limits	
Verify the Sensor Function	

Smoothness Sensor Setup

Table 6-9 Smoothness Sensor Setup

Procedure	Refer To
Alignment of Sensor Heads	
Set Up the Cooling Unit	*1190 Liquid Cooling Unit Reference Manual, 3BUS 208 146 RXX01*
External Electronics Setup	
Nitrogen System Setup	
Digital Input Invert Adjustment	page 155
Performance Verification	

Microwave Sensor Setup

Table 6-10 Microwave Sensor Setup

Procedure	Refer To
Alignment of Sensor Heads	*Microwave Moisture Sensor Manual, 3BUS 208 118 RXX01*
Enter the Head Constants	page 131
Calibrate Temperature Compensation	
Verify Sensor Function	*Microwave Moisture Sensor Manual, 3BUS 208 118 RXX01*
Setup Default Compensation	page 156

Smart Color Sensor Setup

Table 6-11 Smart Color Sensor Setup

Procedure	Refer To
Alignment of Sensor Heads	*Smart Color Sensor Support Manual, 3BUS 208 130 RXX01.*
Enter the Head Constants	
Set Standardize Limits	
Verify Sensor Function	

IR CoatWeight Sensor Setup

Table 6-12 IR CoatWeight Sensor Setup

Procedure	Refer To
Alignment of Sensor Heads	*Smart ReflectionPlus CoatWeight Sensor Manual, 3BUS 208 137 RXX01.*
Enter the Head Constants	
Set up Cooling Unit	
Set Standardize Limits	
Verify Sensor Function	

Operation of NT Workstation Health Reports

Note: If you are using the DOS/DESQview version of the Service Workstation, you need Version K of this manual.

To activate the Health Reports, double click the Health Report icon (Internet Explorer 5). The first page to come up will be the Service Workstation Links page. This pages serves as an access point to any of the Smart Platforms connected to the QCS LAN.

Figure 6-1 Menu Page with Links to Machines and Frames

When a particular Scanning Platform has been selected, the Frame Health Report Overview for that frame, along with a header panel and a footer (color bars) appear as shown in Figure 6-2. The header panel and color bars are always in view regardless of which sensor or frame page is selected.

The header panel provides the following information and control:

- Customer name, machine number, and frame number/designation

- Scanning Platform system release level

- Current date and time

- Current status of the head command request. In workstation control, these are request buttons.

- Status of End Column Control and selection of Host or Workstation control.

- Current shutter status

- In Workstation control, selection of Clean STDZ or APC Collection.

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The color bars (footer) server several functions.

- They indicate the real sensor configuration compliment of the system.

- They give a color coded indication of sensor status: green for fully functional; red for an alarm condition.
  If the sensor name is flashing, the alarm condition is unacknowledged. Click the sensor name to select the Health Report. Double-click the ABB logo to go to the Service Workstation Links page.

The central portion of each Health Report is unique for each of the sensors and frames. The specific content varies. However, there are common features.

- Each report has a number of tabs listed at the top of the report. They are Measurement, Alarms, Power/Temp History, and, in some cases, Heater.

- Under the Measurement tab, there will be a number of other tabs, each giving access to data fields such as standardize limits and calibration.

- Also on the Measurement tab, located along the bottom, will be a display of subsystem inputs and outputs and associated electronics power, temperature, and HDLC communications status.

- All data fields where entry is permitted will have a white background.

- All other data fields will have a gray background.

- There are various status displays on the reports which give a color background to indicated condition. Green indicates a good status; red indicates a problem. Text relating to the condition is included in the status display.
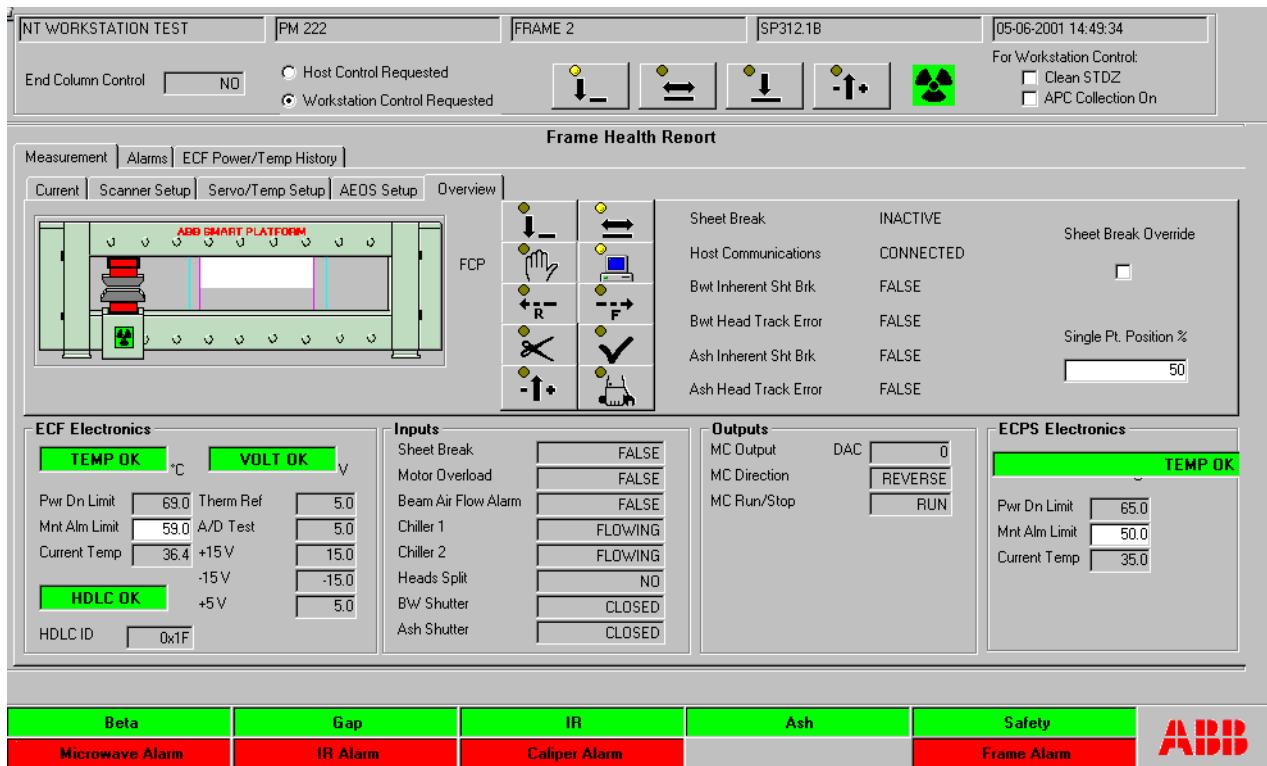
Figure 6-2 NT Workstation Frame Health Report - Overview

The first Health Report to appear after the Scanning Platform is selected is the Frame Health Report (Overview tab). The Overview tab contains the following information:

• A graphic display of the SP, complete with a dynamic head image that reflects the current relative motion and position of the head.

• A representation of the Frame Control Panel (FCP) showing the condition of the LEDs as they appear on the panel.

• A column of special input statuses showing the current condition of sheet break, host communications, and BW and Ash inherent sheet break and head tracking conditions.

• A check box selection to inboke a sheet break override.

• A data field entry for single point position in terms of percent of position between the active scan limits.

To access Help for any of the reports (including the header panel and color bars), place the cursor somewhere within the confines of the panel and press F1. Explanations of various sensor and frame Health Reports are covered as needed.

Temperature Controller Setup for Basis Weight, Ash, and Caliper Sensors

Temperature control maintains the measurement area environment for critical internal components and controls the temperature of the external air column (CAP). Standard operating conditions include mill air temperature environments that vary between 10 °C and 85 °C and sheet temperature up to 148 °C. The environment for internal components and the temperature of the external air column are controlled by the microcontrollers in the ABB Smart Processing Center (ASPC). The software control has an accuracy of ± 2 °C and will maintain the set point within a precision of 0.5 °C. Controller set up is done at the Service Workstation using the Caliper, Ash, and Basis Weight Health Reports. See Figure 6-3 on page 116 for an example of the Basis Weight Health Report (the Ash Health Report is similar). For instructions on how to use the Health Reports, see "Operation of NT Workstation Health Reports" on page 112. Do not change the *kp*, *ki*, or *kd* constants without consulting a specialist.

Temperature controller tuning parameters are determined by the nature of the thermistor type and the immediate heating environment involved. Use the Caliper, Ash, and Basis Weight Health Reports to make the appropriate entries.
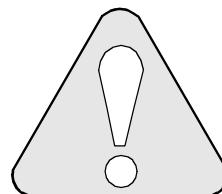
Temperature target should be between 45 °C and 65 °C (never above 65 °C) or electronics damage may occur. Set temperature about 10 to 20 degrees cooler than the temperature four inches from the sheet.

Figure 6-3 NT Workstation Basis Weight Health Report - Heater

Smart Ash and Smart Basis Weight

Temperature controller setup consists of setting control set points and adjusting the air flow. The set point for both the source and detector module should be the same (see Table 6-13 on page 117). The air flow should be adjusted for 4 - 4.5 scfm air flow for each module.

1. Be sure that the Ash and Basis Weight sensor modules have been off-sheet and powered down so that the heads are cold.

2. Turn off the air flow to each module. The valves are located on the air manifold on the back of the basis weight source and detector modules. Valves should be marked.

3. Set the temperature set point for each module.

Note: This adjustment must be made before the source controller begins to operate. If additional time is required, move the source set point to a higher temperature. Be sure not to leave the controller at this higher temperature.

4. Adjust the source air flow while observing the source heater current at the Service Workstation. Adjust flow for 2.2 amperes, this should correlate to about 4.0 scfm. The on time duty cycle must be at 100.

5. Repeat Step 4. for the detector module flow and detector heater current.

6. Reset the temperature set points for the desired operating point as directed in Table 6-13.

Table 6-13 Temperature Controller Tuning Parameters

Temperature Controller	Set Point	Therm Type	Delay	Gain (Kp)	Ki	Kd	Filter (alpha)	Cont No.
BW source head (TLK/TLP)	*	0	20	18.000	0.003	0	0.500	0
BW detect head (TLK/TLP)	*	0	20	15.000	0.002	0	0.500	1
BW detect head (TLS)	*	1	20	15.000	0.003	0	0.500	1
BW source CAP	**	0	200	18.000	0.003	0	0.500	0
BW detect CAP	**	0	200	18.000	0.003	0	0.500	1
BW source HAW	***	0	20	15.000	0.006	0	0.500	0
BW detect HAW	***	0	20	5.000	0.003	0	0.500	1
BW source head (STLK-11, STLP-3)	*	0	20	10.000	0.025	0	0.500	0
BW detect head (STLK-11, STLP-3)	*	0	20	30.000	0.015	0	0.500	1
Ash source head (old)	*	0	0	24.000	0.002	0	0.500	0
Ash source head (STLXR)	*	0	80	10.000	0.025	0	0.500	0
Ash detect head (STLXR)	*	0	80	25.000	0.01	0	0.500	1
Caliper probe	*	1	60	2.0	0.04	0	0.500	0

*   Set to a nominally estimated sheet temperature

**   Set to 5 °C less than the head heater set point

*** Set to 10 °C less than the head heater set point

Note: A hot process requires higher set points. For basis weight and ash, the CAP air system will provide both heating and cooling capabilities, different from previous designs.

7. If ambient conditions are greater than 85 °C, then air flow to each module must be increased. If an air flow of 8.5 scfm is reached at about 3.5 amperes, refer to Table 6-14.

Table 6-14 Flow Versus Current with the Heater Fully On

PTC Heater Character at 30°C Input Air	
Amperes	**scfm**
1.4	2.2
1.8	3.7
2.6	5.7
3.6	8.7
3.7	9.8
Flow ≈ Amps * 2.8 - 1.8	

8. Jog the head package to the coldest location, probably off–sheet, for at least one hour. Verify that the source and detector heater duty cycle is less than 90%. See Figure 6-3 on page 116 for detector heater and source heater duty cycles.

9. Locate the head package in the hottest location for one hour. Verify that the source and detector heater duty cycle is greater than 5%.

10. If Step 8. or Step 9. fail, then repeat Step 4. and Step 6. to obtain reasonable operation. Increasing air flow or control set point will increase duty cycle; lowering air flow or control set point will reduce the duty cycle.

Note: When the sensors are cold, allow 20 minutes before control begins to operate. One hour is required before the sensorsare stable enough for measurement or before duty cycleevaluation.

The Basis Weight detector sensor has a longer thermal time constant. It will take longer for it to come into control.

Using the Optional Temperature Controller Utility

1.   At the $$ prompt, Type:

   uc_heat *n*

   (where *n* =   1 for BW head heaters)

                    6 for Ash head heaters

                    34 for IR head heaters

                    35 for Caliper probe

                    36 for HAW/CAP

                    39 for BW HAW/CAP heaters

2.   When enter menu comes up, select 2 to change heater setup data.

```
Current Microcontroller number is 0x1
            Enter  1 to display heater data
                   2 to change heater setup data
                   3 to monitor one controller
                   4 to change microcontroller number
                   5 to quit this utility: 1
```

3.   When asked, select the desired controller number. The utility requests inputs in the following order (xxx indicates the current value):

   Enter temperature target scaled by 10 (or <cr> for xxx):

   Are further changes needed for this heater controller? (y or n):
       (answer n if just want to set target)

   Thermister type 0 for 5k, 1 for 100k (<cr> for xxx):

   Startup delay in seconds (<cr> for xxx):

   Controller gain (K) scaled by 1000 (<cr> for xxx):

   Integration constant (Bi) scaled by 1000 (<cr> for xxx):

   Derivative constant (Nd) scaled by 1000 (<cr> for xxx):

   Noise filter constant (alpha) scaled by 1000 (<cr> for xxx):

4.   At the conclusion, the utility will respond with the line:

   Enter heater controller number (0 - 3), 4 to send, or 5 to abort:

   Either select a new controller on that same ECS board, send the new data to the ECS board, or abort the process.

   If all the microcontroller within the ECS board have been changed during the session, the data will automatically be sent down without requesting it manually.

Setup of Customer Units

Ream Size

The ream size conversion factor converts the internal computation of basis weight from grams per square meter (gsm) to customer units of pounds per ream. If customer units are to be gsm, the conversion factor is 1.0. Consult the Calibration Report for the correct value and enter it into the software variable name *reamSize*.

Ream size is, by default, controlled from the Scanning Platform Basis Weight Health Report. It is possible to have the Host Computer determine the Ream Size by changing a flag called *hostDefinedReamSize* in the **pmmSensor01** object using the inspect utility. If this flag is set to a "1", the ream size will be determined by what the host sends down at a grade change or a PMMRLD command. If it is a "0", the default condition, then the Health Report controls it exclusively. It is still possible to temporarily change it from the Health Report as shown below, however, care must be taken to return it to its original value when done. This feature is only available on Software Release 280.2 or later, and it will only function if the host has been modified to use it.

Changing Ream Size

1. Access the Basis Weight Health Report from the Service Workstation.

2. Click the Measurement tab.

3. Click the Current tab.

4. Click the white field for Ream Size.

5. Type the desired ream size.

Apparent Density

Apparent density is a computation of basis weight divided by caliper. It is presented on the Host computer display in LMR units. This is weight per Mil-Ream. The default units in the software are metric (grams per micron-square meter). This is controlled by an instance variable called *customerUnitsConversionFactor* in the **pmmApDens01** object. For metric systems, the value is 1.0. For English systems, the value will depend upon the ream size and is governed by the following algorithm:

$$customerUnitsConversionFactor = 0.0052 * \text{reamSize}$$

Using the above algorithm, the computed value for *customerUnitsConversionFactor* should be entered into the system using the ***inspect*** utility and typing the following at the I>:

()[pmmAppDensity01 customerUnitsConversionFactor:x.x]

and then stored on the diskette to the PMM community by using the ***gstore*** utility. To make the change effective without restarting the system, simply initiate a small edge change. The recalculation of the *customerUnitsConversionFactor* is included in the edge change adjustment activity.

Changing Caliper Output Units

To change the output units for the Caliper sensor, access the Caliper Health Report. See Figure 6-4.

1. Select the Measurement tab.

2. Select the Current tab.

3. In the Measurement Units area, click the desired units.

CaliperSensor Health Report

Measurement | Alarms | Temp/Voltage History

Current | Standardize Limits | Tuning/Misc | Calibration

Results

Caliper in Micrometers	0.000
Caliper in CU	0.000
Measurement Validity	0x7002

Sensor Type [GT Calaiper]

Sensor Command [FROM HEAD ▼]

Measurement Units
- ⦿ uMeters
- ○ Millimeters
- ○ Mills

Compensation
☐ APC Active

Computed Pressure

| Top Pressure hPA | -223.045 |
| Bottom Pressure hPA | -0.132 |

Electronics

TEMP OK °C	VOLT OK V
Pwr Dn Lm:	65.0000	Therm Ref:	4.500
Mnt Al Lm:	50.0000	Reference:	4.501
Curr Temp:	25.8407	+15V:	15.139
		-15V:	-14.937

Communications

| HDLC OK HDLC ID | 0x3 |

Inputs

Caliper Signal VDC	8.585466
Top Pressure VDC	-0.000137
Bottom Pressure VDC	6.556128
Defect Count:	0.000000

Outputs

| Top Head Active | OFF |
| Bottom Head Active | OFF |

STDZ Pend | STDZ Curr | CAL Smpl | CHK Smpl

Stdz Time	Dec 30 00:00:00
Alarm	PASSED
Sensor Max VDC	8.0000
Sensor Max Noise	0.0000
Sensor Zero VDC	2.2500
Sensor Zero Raw VDC	0.0000
Zero Gap uMETERS	0.0000
Top Pressure Zero VDC	6.5600
Bot Pressure Zero VDC	6.5600

Figure 6-4 NT Workstation Caliper Health Report

Ash Units Setup

Ash units are determined by the Host computer. Refer to the Host computer documentation for setup of percent basis weight, percent bone dry weight, and ash weight.

Enter Calibration Head Constants

Calibration head constants have to be entered into the Scanning Platform software. The values for these constants can be found on reports for the Basis Weight (includes Air Column), and Ash sensors or tags for the IR Moisture and Caliper sensors. For the OptiPak and Gloss sensor, values are entered through an interactive **genrpt** program that allows the software to calibrate the constants it needs on line.

Basis Weight Sensor

The Basis Weight sensor head constants are K0, K1, K2, K3, WCC, and AM. These constants may be different for every sensor. They may need to be changed if certain components in the sensor geometry are repaired or replaced. Change sensor constants using the Basis Weight Health Report, Figure 6-5. See "Operation of NT Workstation Health Reports" on page 112 for an overview of the Health Reports.

The Basis Weight sensor calibration constants consist of one or two sets of constants. Table 6-15 lists the head constants for the Basis Weight sensor. Table 6-16 lists the optional constants and values for the Air Temperature Compensation (ATC).

Table 6-15 Basis Weight Calibration Constants

Head Constant	Value - betaSensor01 (Enter values from the Calibration Report)
K0	
K1	
K2	
K3	
WCC (Smart Basis Weight only)	
AM (Smart Basis Weight only)	

Measurement Setup

Figure 6-5 NT Workstation Basis Weight Health Report - Calibration

Table 6-16 Basis Weight Sensor ATC Calibration Constants

ATC Constant	Basis Weight Sensor Model			
	TLK-5	TLK-8	TLK-9	TLP-1
KT0	0.0	0.09765	0.1758	0.0
KT1	0.5859	0.09375	0.2148	0.1953
KT2	-0.3477	0.2813	0.0	0.1953
KT3	0.0	0.0	0.0	0.0
dBWdT	-0.1	-0.1	-0.1	-0.1

Enter the calibration head constants into the Scanning Platform software through the Basis Weight Health Report.

Air Column Measurement
(Smart Basis Weight Sensor Only)

Air column measurement constants are changed using the Air Column Sensor Health Report in a manner similar to the way Basis Weight sensor constants are changed (see Figure 6-5 and Figure 6-6). There are five air column measurement sensor constants, KZ0, KZ1, KZ2, KZ3, and gap offset. These constants are shown as K0, K1, K2, and K3 on the screen. Record the constants in Table 6-17.

Figure 6-6 NT Workstation Air Column Health Report - Setup

Table 6-17 Air Column Measurement Constants

Head Constant	Value (Enter values from the Calibration Report)
KZ0	
KZ1	
KZ2	
KZ3	
gap offset	

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IR Moisture Sensor

Calibration head constants are found on the calibration tags on each IR sensor. Enter those values into the Scanning Platform software using the appropriate Health Reports

Figure 6-7 NT Workstation IR Moisture Health Report - Calibration

Table 6-18 Head Constants

Nameplate Name	Value to Enter
A1	
A2	
CW	
B1	
B2	
WTBP	
SDELTA or DELTA	
A	
B	
C	
DELTA1	
DELTA2	
KF1 or KF	
KF2	
A1	
B1	
C1	
D1	
CW1	
A2	
B2	
C2	
D2	
CW2	
A3	
B3	
C3	
WTBP1	
WTBP2	

Ash Sensor

The Ash sensor uses seven unique head constants for a flag-in operation and another unique seven constants for a flag-out operation. If the sensor is a Smart Ash, there are two additional head constants. These are listed in Table 6-19. The 14 values for flag-in/flag-out operation are found in the Ash Calibration Report. The two additional constants for Smart Ash operation are found in the Smart Basis Weight calibration report under Air Column data. Head constants from the calibration report can be entered into the system using the Ash Sensor Health Report (Figure 6-8). See "Operation of NT Workstation Health Reports" on page 112 for an overview of the Health Reports.

Table 6-19 Ash Sensor Head Constants

Head Constant	Flag-In	Flag-Out
BW Corr Factor (A2)		
Corr Offset (B2)		
Mo Corr Factor (C2)		
K0		
K1		
K2		
K3		
Gap WCC (Smart Ash Only)		
Air Mass (Smart Ash Only)		

Figure 6-8 NT Workstation Ash Health Report - Calibration

Sheet Temperature Sensor

Use the Sheet Temperature Health Reports to change the calibration constants. Figure 6-9 shows an example of the Temperature Health Report.

For instructions on calibrating the Sheet Temperature sensor, see the *Sheet Temperature Sensor Reference Manual, 3BUS 208 123 RXX01.*

Figure 6-9 NT Workstation Temperature Health Report - Calibration

Gloss Sensor

Table 6-20 identifies the variable names of the two head constants. Enter the values you read from the sensor head nameplate into the specified instance variable column and store them in the frame community using the *gstore* utility.

Table 6-20 Head Constants for the Gloss Sensor

NamePlate Name	Instance Variable Name	Value
GL1HC1	headConstant1	
GL2HC2	headConstant2	

1. At the $$ prompt, type *genrpt*.
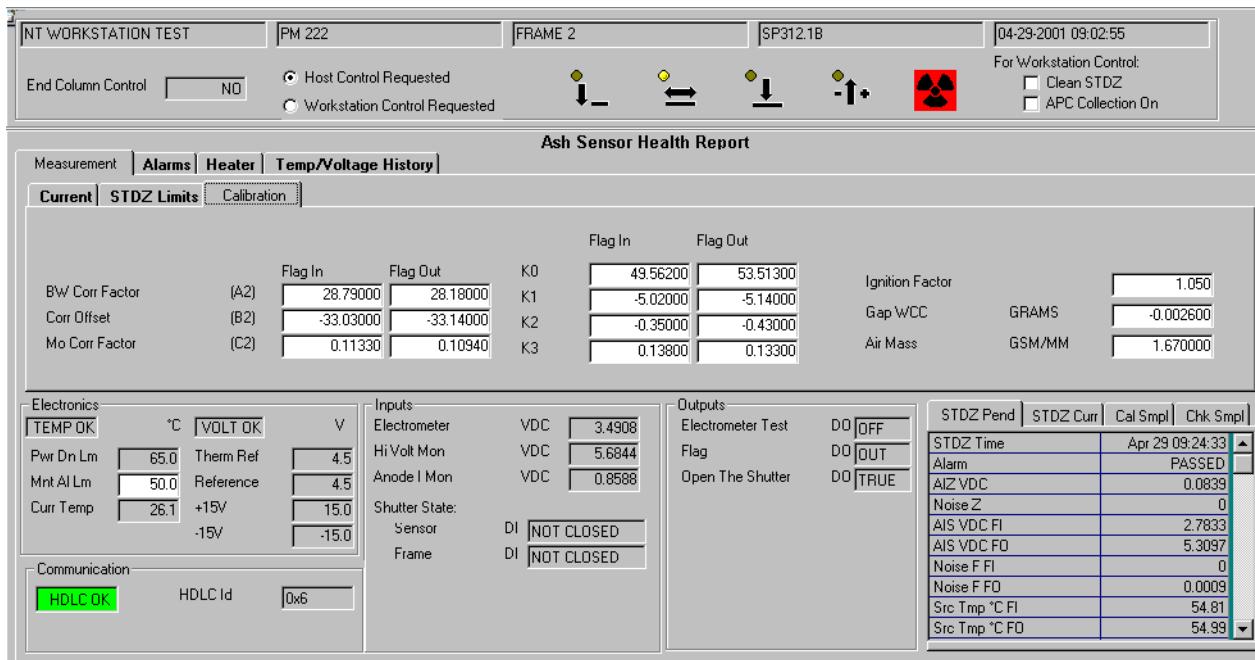
The current calibration head constants, giving variable name and current value, will be displayed on the console. The bottom portion will be an interactive question about changing, redisplaying, or recalculating the current values. See Figure 6-10.

```
            GENERAL SENSOR REPORT TUNING UTILITY; rev date 8 Sep. 1989.
Enter the name of the sensor you wish to view.
TopGlossSensor01
Do you wish to view Standardize variables or Calibration constants? (s or c)
c
   GLOSS SENSOR CALIBRATION CONSTANTS TUNING UTILITY; rev. date 27 Mar., 1990.

                        Current Calibration Constants


Variable Name          Current Value
1: headConstant1        26.00000
2: headConstant2        0.000000

Enter 1 to change head constants
      2 to re-display head constants
      3 to calculate new head constants
      q to exit

Do you wish to view another sensors report? (y or n) n
```

Figure 6-10 Gloss Sensor Calibration Report

2. If a current value is to be changed, enter a **1** and continue to the next step. If you wish to redisplay the constants, enter a **2** and observe the screen refresh. If you wish to calculate new constants, enter a **3** and follow the interactive instructions. If no changes are to be made, answer **q** and skip to Step 6.

3. If **1** is selected, the console will then ask which variable is to be changed. Enter the variable number. If **3** is selected, go to the "Gloss Sensor Head Constant Tuning" on page 130.

4. The console will then confirm the variable name and wait for the new value to be entered.

5. The console will ask again if a variable is to be changed. If yes, answer *y* and go back to Step 3. If no, answer *n* and continue.

6. The console will give instructions regarding the selection of another report if desired. If no, answer *n* and the utility will exit to the AVOS shell ($$). If yes, answer *y* and the utility will restart as if *genrpt* had just been entered.

Gloss Sensor Head Constant Tuning

The gloss head constants are adjusted so that the sensor will correlate to the laboratory measurements. Since the instruments used in the lab will read slightly different from one to another, the head constants determined in Columbus are attached to the sensor, but are marked as approximate numbers.

The following interactive procedure is to be used to fine tune the sensor response to the customer's lab. It uses two lab sample readings which are entered by the user, and the results of the sample check readings on the same two samples. The recalibration routine is selected interactively using *genrpt*. After running the routine, and there are no errors, the newly computed head constants are stored in memory. The user must save the new values to RAM disk in the frame community by using the *gstore* utility.

Note: This procedure involves a series of interactive steps including work at the console and performing sample checks. Before starting, read through the entire procedure making sure that all resources and time are available to complete the procedure without interruption.

1. Ensure that the laboratory instrument is calibrated with the calibration standards that come with it.

2. Read the Gloss sensor's check samples on the laboratory device, noting the proper measurement area and direction of measurement. Take several readings and calculate the average.

3. Allow the Gloss sensor to thermally stabilize for at least two hours. Clean the windows and standardize.

4. Place the Gloss sensor in sample check mode 1 from the Host computer.

5. Activate *genrpt* for the Gloss sensor and select recalibration by entering a **3**.

6. Enter the average Lab 1 sample value at the prompt.

7. Run a sample check on the same sample used for Lab 1.

8. Enter the average Lab 2 sample value at the prompt.

9. Run a sample check on the same sample used for Lab 2.

10. The new head constant values will be reported.

    If there are no errors, the user will be instructed to write the values to diskette using the *gstore* utility.

11. Exit the sample check mode when completed.

Error Conditions

•   The absolute value of the difference between the two lab values (Lab 2 - Lab 1) is less than or equal to 15.

•   Calculated head constant GL1HC1 is less than 5 or greater than 50.

•   Calculated head constant GL1HC2 is less than -15 or greater than 15.

Caliper Sensor

Use the Caliper Health Reports to change the calibration constants. Figure 6-11 shows an example of the Caliper Health Report. Caliper calibration constants for your caliper sensor may be different. ***See the appropriate caliper sensor manual and your calibration report.***
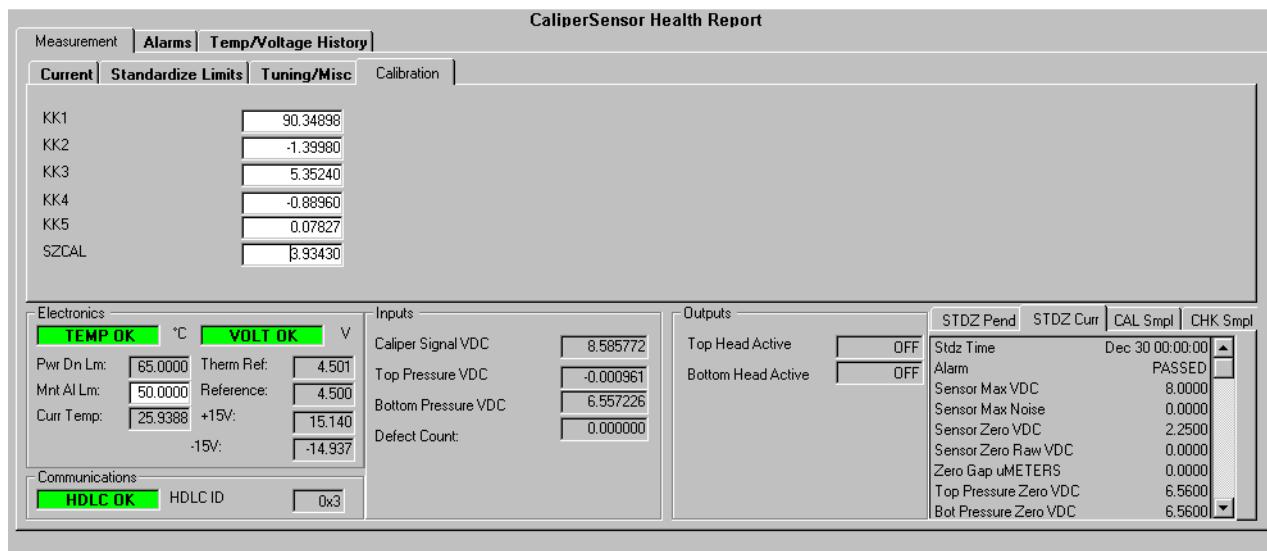
Figure 6-11 NT Workstation Caliper Health Report - Calibration

Microwave Moisture Sensor

The Calibration Head Constants are found in the Sensor Calibration Report supplied with the sensor. The entries are summarized in Table 6-21 given below. Enter them into the system using the Health Reports.

Table 6-21 Microwave Moisture Calibration Constants

Head Constant	Value
Wt Slope Factor	
Target Moisture	
Sensor Slope	
Target Voltage	
Target Weight	
Temp Corr Coeff	
Target Temp	
Moisture Breakpoint	
Temp Correction Factor	
Temp Correction Exponent	

Standardize Limits

Standardize limits are entered via the Standardize Limits tab on each Health Report.

General Information

There are a number of options and scenarios available which control how the standardize feature is to be operated. These are:

- Time interval between standardizes

- The selection of CLEAN or DIRTY standardize modes

- Standardize delay after long off-sheet periods

- Reporting of "internal" check sample during standardize

Time Interval between Standardizes

The time interval between standardizes is generally controlled by the host computer, except for AccuRay Direct systems. A minimum time interval should be 30 minutes. On AccuRay Direct systems, the interval is controlled by an instance variable called *stdzPeriod*, located in each of the sensor objects present in the system. If any of the sensors have a non-zero value in this variable, that value will be used to establish the standardize interval. For AccuRay Direct systems interfacing with a foreign DCS (not Smart CD to an 1180M), only one sensor needs to have an interval defined since one serves all. On AccuRay Direct systems, the default time within each sensor is set to 60 minutes. For AccuRay Direct connected to an 1180M via the Smart CD interface, the value for the *stdzPeriod* in each sensor should be set to zero if the interval being scheduled by the host is greater than 60 minutes. If it is less, then no change is required since the most frequent interval prevails.

The Selection of CLEAN or DIRTY Standardize Modes

CLEAN and DIRTY standardizes are selectable from the host computer (1190 and 1180M) and can be either manually requested or defined at the time of automatic standardizes. Of all the sensors available in the system, only Basis Weight, GT Caliper, and OptiPak (FOB) have any sensitivity to what mode of standardize has been selected. It is possible to have one of these sensors responding to a DIRTY standardize request while the others are held to doing only CLEAN standardizes. As an example, in a system with both Basis Weight and GT Caliper, it may be desirable to have the Basis Weight sensor only doing CLEAN standardizes while the GT Caliper must be doing DIRTY standardizes due to the environmental aspects of the paper machine. In this case, the host would be set up to request DIRTY standardizes while the Basis Weight sensor on the Scanning Platform is set up to do a CLEAN standardize every time a DIRTY one is requested. In all cases after a system reset, regardless of how the various CLEAN/DIRTY flags are set, the system will force a CLEAN standardize on all sensors which require one. The CLEAN request will continue until all of those sensors have passed their initial standardize.

Figure 6-12 on page 134 describes the standardize CLEAN/DIRTY mode selection that takes place when a standardize is requested from either the Host, the Health Reports (HP), or the Frame Control Panel (FCP). To summarize the three situations, whenever DIRT standardizes occur and are accepted by the sensors; the OptiPak sensor can be set up to basically ignore standardize requests, the Basis Weight sensor will take into account the effect on beam absorption when dust accumulates on the window, and the GT Caliper sensor will filter the sensor zero (SZERO) results for GT Caliper to adjust for the effects caused by dust on the probes.

Standardize initiated from the Frame Control Panel (FCP) is either CLEAN or DIRTY depending on the state of the instance variable *localStdzMode* in the object *fhi01*. The default setting for this variable is DIRTY. This can be changed to be CLEAN by changing the value from a "0" to a "1" (if this change is to be retained after a system reset, the "fhi" graph needs to be saved with the ***gstore*** utility). A reset is NOT needed to make the change active.

In any CLEAN standardize request, an automatic internal check sample for those sensors so equipped, is executed.

Note: Three sensor categories require a "good" CLEAN standardize before they can be made operational after a restart. These are the OptiPak (FOB), Caliper sensor, and ALL Basis Weight sensors. After a restart, and regardless of which kind of standardize is being requested from the host, Frame Control Panel, or Health Reports, a CLEAN standardize will be scheduled for these sensors until the initial standardize is passed. The individual sensor manuals should be consulted to see the effect of a CLEAN or DIRTY standardize selection.
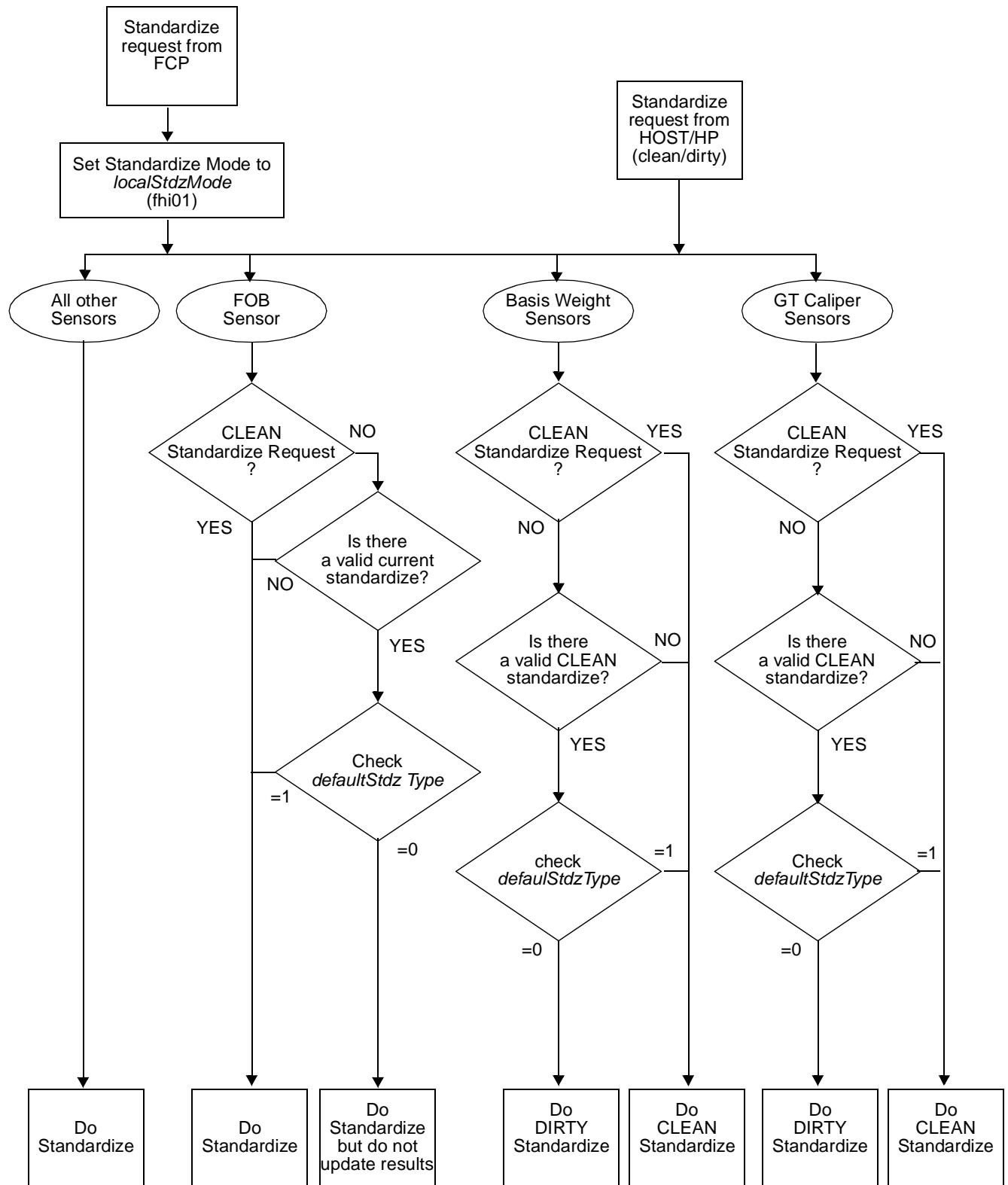
Figure 6-12 Standardize Mode Selection

Standardize Delay After Long Off-Sheet Periods

There is a "delayed standardize feature" which allows the system to delay a DIRTY standardize request until the head has scanned for a specified amount of time, after the head has been off-sheet for a specified amount of time. This feature is desired where a lot of dust is present in the air and this dust settles on the GT Caliper probes while off-sheet for an extended time. In that case, the head is desired to scan (to rub the dust off the probes) before doing a standardize. This delayed standardize feature is also desirable for all the other sensors in that it assures a correct standardize after the sensors have been reconditioned to the sheet after long idle periods. Not allowing the sensors to recondition before standardizing can cause measurement inaccuracies if the head has been off-sheet long enough to cool. During this time delay, the measurements will be valid provided there was an initial good standardize.

There are four instance variables associated with this feature. Two are setup variables accessible on the Frame HealthReport, *offSheetTime* and *onSheetTime*, while the other two, *stdzRequested* and *stdzDelayRequired*, both located in the **scanner01** object, are status flags used to identify the current status of any standardize delay. The *stdzDelayRequired* will indicate a 1 if the off-sheet position has been active for more than the *offSheetTime*. The *stdzRequested* instance variable will indicate if a new request from the host or Health Reports has been received after the *onSheetTime* has expired. A value of 0, the current default value for *offSheetTime* and *onSheetTime*, will turn off the feature. The recommended starting value for the off-sheet timer should be 10 minutes (600 seconds), and for the on-sheet timer, 6 minutes (360 seconds). Experiment to determine the most appropriate off and on sheet delay times for each site. This feature is bypassed when a local standardize is requested from the FCP or if a CLEAN standardize has been requested from the host or Health Reports.

Reporting of "Internal" Check Sample During Standardize

Several sensors have an internal check sample which is monitored at a CLEAN standardize request. The internal check sample can be also monitored at selected DIRTY standardize intervals. The sensors involved are Smart Basis Weight, Smart Ash, GT Caliper, Color, and IR Coat Weight. There is an instance variable called NAUTO for each of these sensors. If it is set to 0, no internal check sample will take place during a DIRTY standardize request. If it is a positive number, then the number will define the standardize interval between internal check samples done at DIRTY standardizes. If the number is set to a negative value, then the internal check sample will place it at the beginning and again at the end of the standardize sequence.

Health Report Standardize Reports

There are two standardize reports available on the Health Report: Pending (STDZ Pend) and Current (STDZ Curr). The STDZ Pend report is the last standardize results, either passed or failed, that was executed. The STDZ Curr report is the last passed standardize and is the one the sensor would be currently using while scanning or in single point. If the pending report shows failure, the sensor will still be able to show a measurement on the Health Report; however, data sent to the host will be marked invalid.

Changing the Standardize Mode of the FCP Standardize Request

The default standardize mode requested from the FCP is DIRTY. This can be changed to be CLEAN by changing and saving the mode flag in the FCP data base. A reset is NOT needed to make the mode flag change active. Note that regardless of the setting of the mode flag, a CLEAN standardize will always be performed after a reset.

To change the mode flag, proceed as follows:

1. Activate the *inspect* utility.

2. Change the mode flag by typing:

   I> fhi01->localStdzMode=x

   where x =   0 for DIRTY
                     1 for CLEAN

3. Exit the *inspect* utility by typing: **:q**

4. Save the change to the frame community using the *gstore* utility.

Controlling the Type of Standardize for a Specific Sensor

With Software Release 280.1, the system now has the ability of specifying for each sensor, what type of standardize is to be performed when a DIRT standardize is requested from the Host. Most sensors do not perform differently for either a CLEAN or DIRT standardize, but for those that do, it may be desirable at times to always have a CLEAN standardize even when a DIRT standardize is requested. The sensors in question which can sense the difference are the weight and caliper sensors. Another sensor which now joins this group, is the OptiPak sensor. With this feature turned on for the OptiPak, the sensor will ignore collecting new standardize data at a DIRT standardize request. The only time the OptiPak sensor will actually establish new standardize data is when a CLEAN one is selected.

The instance variable *defaultStdzType*, located in each sensor object, determines what type of standardize the sensor will perform whenever a DIRT standardize has been requested by either the host or the workstation. The selection code used to determine whether it is a CLEAN or DIRT standardize, is "1" for CLEAN and "0" for DIRT. Therefore, if the *defaultStdzType* is set to a "1", the sensor will do a CLEAN standardize as requested, except of course the OptiPak sensor which will not standardize at all. CLEAN standardizes are always responded to by the sensors as requested. The default value of the *defaultStdzType* for all sensors except for OptiPak is a "0". The value for OptiPak is defaulted to a "1".

It should be noted that no capability in the standardize process has been lost. What this means is more flexibility as to what type of standardize is done when a DIRT standardize has been requested.

Smart Basis Weight Sensors

Internal check sample may be automatically initiated at a dirty standardize. It will be forced at each clean standardize. The variable *NAUTO*, available through the *inspect* utility or the Basis Weight Health Report (see Figure 6-13), determines the frequency of internal check sample relative to dirty standardize. If set to zero, there will be no automatic internal check sample. If set to an integer (*n*) greater than 0, then an automatic internal check sample will be run every *n* dirty standardize(s).

See Table 6-22 for the acceptable range of standardize limits for the Basis Weight sensors.
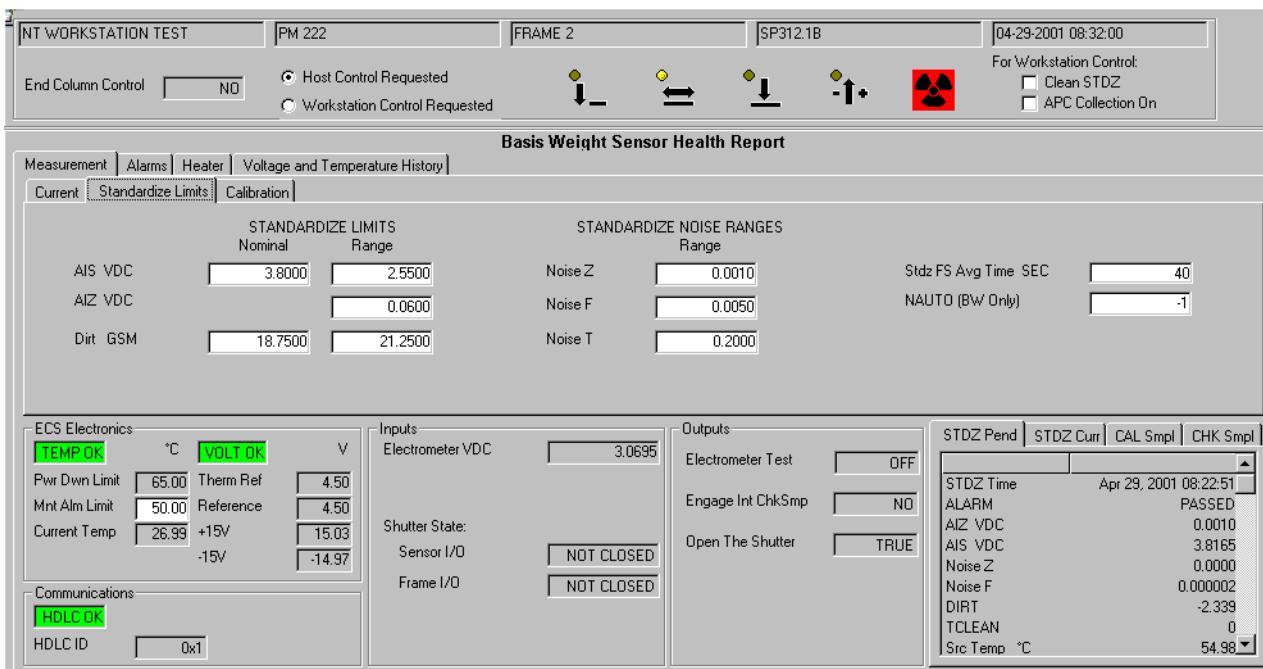
Figure 6-13 NT Workstation BW Health Report - Standardize Limits

Table 6-22 Range for Basis Weight Sensor Standardize Limits

Host Report Name	Variable Name	Function	Acceptable Values
AIZ	AIZ Nominal	Expected voltage with shutter closed	0.0 VDC
	AIZ Range	Plus and minus limits for zeroScaleNominal	0.1 VDC
SIGMAZ	Noise Z	Standard deviation of the source closed signal	<0.00001 VDC ^{2}
AIS	AIS Nominal	Expected voltage output of the electrometer with nothing in the gap	3.0-9.0 VDC
	AIS Range	Plus and minus limits for fullScaleNominal	0.5 VDC
SIGMAB	Noise F	Standard deviation of the electrometer output signal with nothing in the gap.	<0.4 VDC^2
DIRT	DIRT Nominal	One half of the allowed dirt accumulation permitted for the sensor in gsm	TLK/STLK - 18.5 GSM $\pm$ 21.25 TLP/STLP - 4.5 GSM $\pm$ 5.5 TLS - 45 GSM $\pm$ 5 5
	DIRT Range	Equal to the dirtNominal entry	

Note: You have to observe source decay, which will reduce the AIS value by 3.4% per month for STLP and 0.7% per month for STLK sensors.

Caliper Sensor

The Caliper sensor is unique in that only the nominal values may be set by the user. Ranges, both for failure and maintenance, are calculated internally. The failure range is calculated every time the nominals are changed. The maintenance range is calculated only when a clean standardize has been selected.

See Table 6-23 for the acceptable range of standardize limits for the Basis Weight sensors.
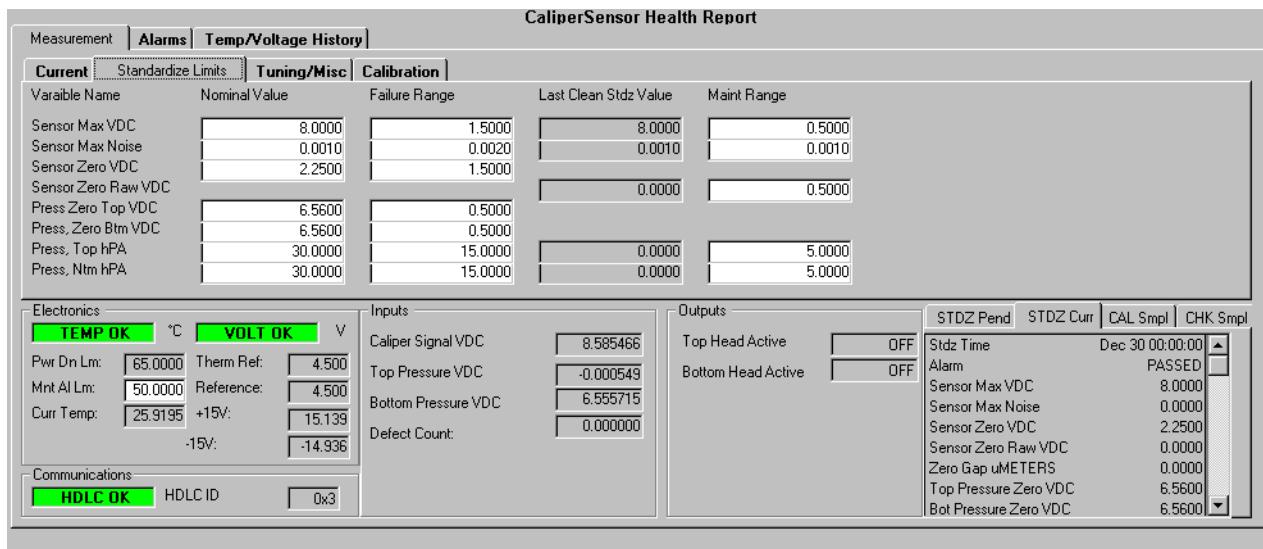
Figure 6-14 NT Workstation Caliper Health Report - Standardize Limits

Table 6-23 Range for Caliper Sensor Standardize Limits

Host Computer Reporting Name	Variable Name In Caliper Health Report	Variable Description	Acceptable Range
SMAX	Sensor Max	Expected output voltage of the proximeter switch with the heads unclamped	Air Brng Cal: 7.5-9.0 VDC GT Caliper: 8.25 VDC $\pm$ 1.0
SNOISE	Sen Max Noise	Standard deviation of the maximum sensor signal noise in mv	< 10 mv
SZERO	Sensor Zero	Expected voltage of the proximeter output with nothing in the gap and the heads clamped. On GT Caliper, this value is filtered by the "Sensor Zero Filter Factor Up/Down"	Air Brng Cal: 3.0-4.0 VDC Cont Cal (Al foot): 5.5-7.0 VDC Cont Cal (Ti foot): 3.5-5.0 VDC GT Cal - 2.25 $\pm$ 1.0 VDC
	Sensor Zero Raw	The unfiltered value of the GT Caliper signal with the probe closed. It is usually determined from the GT Caliper calibration report. On GT Calipers calibration reports without this variable, it can be determined by cleaning the probes and doing a CLEAN standardize. The value to use will be the resulting measured Sensor Zero.	GT Cal - 2.25 $\pm$ 1.0 VDC
	Pressure Zero Pressure Zero Top (GT) Pressure Zero Bot (GT)	This is the output signal of the pressure transducer when there is no pressure being applied to the probe.	GT Cal - 5.0 VDC - 7.0 VDC Other Calipers - 7.0 VDC - 9.0 VDC
	Pressure Top Pressure Bottom	Pressure at top and bottom heads of GT Caliper, with air solenoids engaged, in milli-bars.	12.5 - 50 mb

Host Computer Reporting Name	Variable Name In Caliper Health Report	Variable Description	Acceptable Range
PRESSURE	Contact Press	Pressure transducer voltage difference in volts (globalPressure - PressureZero)	Air Brng Cal: 1.2-2.0 VDC Cont Cal 0.2 - 0.3 VDC
DSAIRB (air bearing sensor only)	Air Brng Pressure	Air bearing voltage difference in volts (airBearingStats - sensorZero)	Air Brng Cal: 0.7-0.9 VDC Cont Cal: 0 VDC
ABNOIS (air bearing sensor only)	Air Brng Press Noise	Air bearing noise in mv	< 5 mv
VACREF (air bearing sensor only)	Vacuum Signal	Vacuum signal voltage in volts	Air Brng Cal: 6.8-7.8 VDC Cont Cal: NA

IR Moisture Sensor

Table 6-24 Range for IR Sensor Standardize Limits

Host Computer Reporting Name	Variable Name In IR Health Report	Description	Acceptable Range
AAIR	AAIR	Standardize air gap reading for the absorption signal on transmission–type sensors.	6.5 VDC ± 2.5
RAIR	RAIR	Standardize air gap reading for the reference signal on transmission–type sensors.	6.5 VDC ± 2.5
AFLAG	AFLAG	Standardize flag reading for the absorption signal on reflection–type sensors.	5.7 ± 0.7
RFLAG	RFLAG	Standardize flag reading for the reference signal on reflection–type sensors.	5.7 ± 0.7 VDC
KC	KC	Standardize ratio A/R	1.0 ± 0.2 KC should not drift more than 0.01 units from standardize to standardize; drift could indicate dirt or condensation on the windows.
SIGMIR	SIGMIR	This is one standard deviation of noise. It is reported in percent of noise of the A/R ratio.	0.00005 ± 0.00005 Values outside of this range indicates head or cabling problems.
IRGAIN	IRGAIN	Preamp gain required to achieve the RAIR reading; applies only to transmission–type sensors	HemiPlus and Lt Hemi - 4 ± 3 Hvy Hemi - 11 ± 3 If the gain changes, it is an indication of dirt buildup, changes in the chiller, problems with the detector, or lamp problems.

OptiPak Sensor

Table 6-25 Range for OptiPak Standardize Limits

Host Computer Reporting Name	Variable Name In OptiPak Health Report	Variable Description	Acceptable Range
Full Scale Volts	FULL	Maximum output voltage of each OptiPak component with nothing in the gap. NOTE: Due to lamp brightness decay, the signal strength may lose up to 15% in each year of operation.	Formation: 0.105 ± 0.025 VDC Opacity: 5.0 - 9.5 VDC Brightness: 1.0 - 4.5 VDC
Zero Volt	ZERO	Minimum output voltage of the Brightness and Opacity sensors with the source turned off.	0.125 ± 0.025 VDC
Vacuum Volts	Vacuum	The vacuum signal with no process in the gap.	7.5 ± 0.146 VDC

Ash Sensor

Table 6-26 Range for Ash Sensor Standardize Limits

Host Computer Reporting Name	Variable Name In Ash Health Report	Variable Description	Acceptable Range
AIZ	Zero	Voltage with the electrometer clamped.	0.0 ± 1.0 VDC
SIGMAZ	Zero Noise	Standard deviation of the clamped electrometer signal.	<0.001 VDC
AISOUT	Nominal Flag Out	Voltage output of the electrometer with nothing in the gap.	7.3 ± 1.9 VDC
SIGMAGO	Noise Range - Flag Out	Standard deviation of the electrometer output signal with nothing in the gap.	TBD
AISIN	Nominal Flag In	Voltage output of the electrometer with nothing in the gap.	(45% to 85% of AISOUT) ± 1.0 VDC (See note below)
SIGMAGI	Noise Range - Flag In	Standard deviation of the electrometer output signal with nothing in the gap.	TBD

Note: After determining what the AISOUT value is, make sure that the AISIN value falls to within the 45% to 85% range of AISOUT. Determine the percentage by calculation. Set nominal for AISIN so that it is the correct percentage of AISOUT.

Gloss Sensor

Table 6-27 Standardize Limits for the Gloss Sensor

Host Computer Reporting Name	Variable Name In Gloss Health Report	Variable Description	Acceptable Range
stdzAdjNominal		Nominal value for limit checking the maximum signal output on air. It should be about 1.7 VDC.	1.71 VDC
stdzAdjRange		Range limit of the maximum signal output on air. It should be set to 1 VDC.	± 1 VDC
stdzZeroOffset-Nominal		Nominal value for limit checking the minimum signal output with the measurement clamp. It should be about 0.06 VDC.	0.26 VDC
stdzZeroOffset-Range		Range limit of the minimum signal output with the measurement clamped. It should be set to 0.1 VDC.	± 11 VDC
stdzVacuumNominal		Nominal value for limit checking the head pressure associated with the vacuum. It should be about 7.5 VDC. Note that increasing pressure decreases the voltage.	7.5 VDC
stdzVacuumRange		Range limit of the head pressure associated with the vacuum. It should be set to 1.5 VDC.	± 1.5 VDC

Verification

Background

Sensor verification is the process of determining if the measurement signals from the sensor are being processed into correct measurement values at the Host. This can be done in an uncomplicated manner by using standard check samples and comparing the results of on line measurements to those known values.

If you have trouble verifying sensor performance, then you would want to use a more vigorous methodology to examine sensor performance.

Initial verification of sensor performance can be accomplished using the Service Workstation and the sensor Health Reports. Initial verification of the Moisture and the Ash sensors cannot be done independent of the Host because setup specific compensation factors must be set up at the Host. For long-term verification for sensor performance, refer to the sensor verification procedures in your Host documentation.

It is important to organize the sensor verification process into distinctive phases with a different set of procedures and goals for each phase.

Phase I - Initial Static Verification

The purpose of this activity is to verify that the Scanning Platform and its associated sensors have been properly installed and adjusted and that all calibration constants are correctly entered. During this phase, the measurement system is also tested for stability and repeatability, to assure that it is ready to start the on–line measurement. Typically, this program takes one day.

Phase II - Process Measurement Verification

This phase of the program has the goal of verifying on–line measurement during dynamic conditions to the customer laboratory standards, on some of the key grades of paper being run in the process. This phase is usually 1-4 weeks.

Phase III - Continuing Certification

The purpose of this phase is to assure that long-–term measurement performance is stable, and to alert about any potential problems before any degradation can happen in measurement quality. This phase is organized to give a reliable long-–term performance record to the system by means of simple, periodic checks, and record keeping. By definition, this phase lasts for the life of the system.

Implementation of the Sensor Verification Program

A major portion of Phase I can be implemented using only the Service Workstation and the Scanning Platform.

Activities include:

- Reading of all of the check samples

- Recording standardize stability

- Recording check sample repeatability

- Recording internal check sample readings

- Verifying calibrate sample function operation

- Scanning on air gap and on samples to verify static profiles (requires Host system)

- Generation of Phase I verification results report.

Phase II and Phase III are implemented using mostly the Host computer reporting and graphing packages.

Air Temperature Compensation for Basis Weight (TLK-5/-8/-9 ONLY)

Air Temperature Compensation (ATC) corrects the basis weight measurement for changes in air density due to temperature changes in the measurement column. ATC measures the temperature at clean window standardize and then corrects the basis weight measurement for deviations from the last clean standardize value at each measurement.

Note: ATC should not operate while using the air gap conditioner (AGC). Tune ATC with AGC turned off.

The temperature measurement is the weighted sum of four signals derived from thermistors in four locations: Source head, Detector head, Air gap above the sheet, Air gap below the sheet.

Tuning ATC involves:

*   Verifying the measurement stability of the beta sensor

*   Tuning ATC based upon its response to an artificially induced temperature gradient

Verification of Setup and Stability

1. Access the *inspect* utility at the Service Workstation.

2. At the **I>** prompt type:

    BetaSensor01->tempCompFlagExists=1

3. Save the change using the *gstore* utility.

4. Restart the system to complete the enabling process.

5. Use the Basis Weight Health Report to check the default values for *temperatureCoefficients* coldstart file and compare them to the values in Table 6-28 for your specific sensor type. Update the coefficient array if it does not match the values in the table. The default for *dBWdT* is shown in the table. If it is different from that reported on the Health Report, then a previous adjustment has been made. Do not change it at this time.

Table 6-28 Default Sensor Temperature Coefficients

Variable	TLK5	TLK8	TLK9	TLP1
temperatureCoefficients 1	0.0	0.09765	0.1758	0.0
temperatureCoefficients 2	0.5859	0.09375	0.2148	0.1953
temperatureCoefficients 3	-0.3477	0.2813	0.0	0.1953
temperatureCoefficients 4	0.0	0.0	0.0	0.0
dBWdT	-0.1	-0.1	-0.1	-0.1

6. Adjust the air pressure to the air wipes up to 35 psig (pounds per square inch gauge).

7. Place the system in Sample Check Mode to verify off–sheet stability.

8. Move the sensor to the off–sheet position and let it stabilize for 10 minutes.

9. Clean the sensor windows and then perform a clean standardize.

10. Perform several sample checks without a sample in the air gap. Check the values of **PPT** and **STANDARD WT** on the Sample Check Report.

    •The specification for **STANDARD WT** is 0.0 ± 0.2 gram.

    •The specification for **PPT** at clean standardize is 1000 ± 0.5.

    If the values for **STANDARD WT** and **PPT** do not meet these specifications, there is a basic problem with the basis weight measurement such as:

    •Broken or dirty window on the beta sensor

    •Incorrect head constants

    •Air Wipes are not set up properly

    These conditions will have to be corrected before fine tuning ATC.

11. Take the system out of the sample check mode and turn on ATC by setting the variable *BetaSensor0x->tempCompFlag* to 1.

12. Perform a clean standardize immediately after ATC is turned on.

13. Let the measurement heads scan over the process for approximately 30 minutes.

14. Move the heads to the off–sheet position. Perform several more sample check measurements on air.

15. Compare the check sample readings before and after the air wipes are turned on.

The basis weight measurement from the check sample readings, before and after the air wipes are turned on, should not vary by more than 0.2 G/M^2.

If the basis weight measurement does not meet this specification, then fine tune it by adjusting *dBWDT*. Refer to the procedure on .

Fine Tuning ATC with dBWDT

Fine tuning ATC involves monitoring the measurement response to an artificially induced temperature gradient. For this procedure you will need two people and a 800–1200 Watt heat gun. Using a larger heat source will damage the sensor heads.

Begin with the head package in the off–sheet position without a sample in the gap.

1. Position the heating device in the machine direction at the front of the sensor package, exactly in line with the windows and parallel with the surface. Hold the heat source steady and 12 - 18 inches away from the sensor. See Figure 6-15.
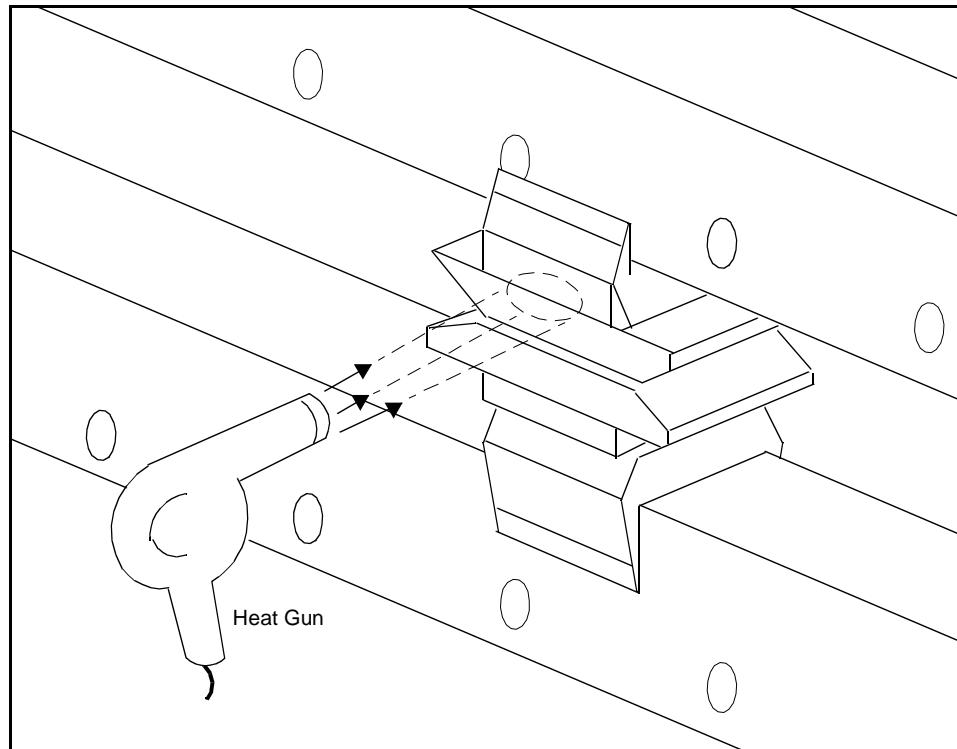
Figure 6-15 Heat Source for Fine Tuning dBWdT

2. Turn on the heat source and let the temperature stabilize for one minute.

3. Perform several sample checks with the heat source on.

4. Average the values of the **STANDARD WT** from the sample checks.

   The value of **STANDARD WT**, after heating the sensor, should be $0 \pm 0.2 \, \text{G/M}^2$. The value of **PPT**, after heating the sensor, should be 1002 to 1005 units. This range indicates a reasonable temperature change. If the **PPT** value is greater that 1005 units, reduce the heat.

5. Adjust the value of **dBWdT** using the following guidelines:

    •If the **STANDARD WT** value is zero, leave *dBWdT* as is.

    •If the **STANDARD WT** value is greater than +0.2, decrease the magnitude of **dBWdT**.

    •If the **STANDARD WT** value is less than - 0.2, increase the magnitude of **dBWdT**.

Note: The range of *dBWdT* is -20 to 0. A more negative value of *dBWdT* means more temperature compensation. A less negative value of *dBWdT* means less temperature compensation.

6. Enter the new *dBWdT* and repeat the sample checks with the heat source On.

    The **STANDARD WT** should be 0.00 ± 0.2.

    If the ATC operation does not meet specifications, check the thermistor operation.

Air Profile Compensation for Ash, Basis Weight (TLK-5/-8/-9), Caliper, Bottom & Top Gloss, and OptiPak

Air profile compensation (APC) allows for any mechanical misalignments of the platform without degrading the measurement performance. During the data collection mode of the APC, the system allows the sensor head to traverse the entire measure limits of the frame (the maximum values allowed for scan limits) without any process in the gap. During this time the system measures deflection related measurement data. This data can be used to smooth out any errors in the measurement due to platform irregularities. For Basis Weight (TLK-5/-8/-9) and Ash sensors only the older ones not being compensated for the gap measurement would need APC.

Air Profile Collection

To use APC the system needs to collect an average air profile. The data collection can be done by using a combination of Host and Workstation commands. The newer Host interface does not support the same interface as older hosts, but the following procedure should work for all systems (independent of the Host). The data collection can only be done while a sheet-break is present (no process present) and with auto-edge-of-sheet turned off.

To collect enough data the sensors must measure a minimum number of scans defined by the instance variable *minAirProfileScans* on a per sensor basis. The default value is 5. When the system finishes generating the air profile the head will move to the off-sheet position and reset the scan limits to the last known values. The number of scans the system automatically makes is 10 unless the operator terminates this operation by taking the frame off-sheet.

Note: Unless otherwise noted all steps are performed from the Service Workstation.

1. If there is not a sheet-break present, use the *dim* utility to invert the input and cause this to happen.

2. Use the *inspect* utility to set the existence flags for the sensors using air profile compensation. From the *inspect* prompt:

    betaSensor01->airProfileCompExists = 1 (for Basis Weight)
    ashSensor01->airProfileCompExists = 1 (for Ash)
    caliperSensor01->airProflieCompExists = 1 (for caliper)
    topGlossSensor01->airProfileCompExists = 1 (for Top Gloss)
    bottomGlossSensor01->airProfileCompExist = 1 (for bottom Gloss)
    optipakSensor01->opacityAirProfileCompExst = 1 AND
    optipakSensor01->brightnessAirProfileCompExst = 1 (for OptiPak)

3. One can set the box width resolution of the air profile independent of the normal profile resolution. One should NOT set this resolution to be finer than the normal profile. Using a larger value sets the box width larger and averages more data per data box. The *inspect* utility should be used as follows:

   betaSensor01->airProfileResolution = x.x (for Basis Weight)
   ashSensor01->airProfileResolution = x.x (for Ash)
   caliperSensor01->airProflieResolution = x.x (for caliper)
   topGlossSensor01->airProfileResolution = x.x (for Top Gloss)
   bottomGlossSensor01->airProfileResolution = x.x (for bottom Gloss
   optipakSensor01->opacityAirProfileResolution = x.x AND
   optipakSensor01->brightnessAirProfileResolution = x.x (for OptiPak)

4. **From the Host**, disable auto-edge-of-sheet.

5. **If a Gloss sensor is present,** insert a sample of the most common grade into the sensor gap. The air to the air bearing sheet guides must be turned off and the sample must be stretched very tightly without any ripples.

   If an Optipak sensor is present, place a sample of the process that simulates the typical process in the gap of the OptiPak before requesting a standardize.

6. Put the system in Health Page control.

7. Set the sheet-break override.

8. On the Health Overview Page for DESQView system or Frame Report for the NT-based system, specify that air profile collection is desired.

   For the DESQView system, select "AIR COMP" for the Head Command.
   For the NT system, select the check box labeled "APC Collection On".

9. Request the system to scan.

10. From the same Health Report, as in step 7 there will be a message indicating the system is in air profile collection mode and it will indicate the number of scans that have been completed.

11. Let the system scan 10 times and it will automatically terminate.

12. **From the Host**, turn auto-edge-of-sheet on

13. If the bit was inverted to cause a sheet-break to be present, use the *dim* utility to restore the sheet-break input processing.

14. If Gloss or OptiPak is present, remove the sample from the applicable sensor.

15. Save the changes using the *gstore* utility.

Enabling APC for Normal Measurement

1. Using the *inspect* utility, turn on the flag to enable air profile compensation. At the *inspect* prompt type:

    betaSensor01->airProfileCompOn = 1 (for Basis Weight)
    ashSensor01->airProfileCompOn = 1 (for Ash)
    caliperSensor01->airProflieCompOn = 1 (for caliper)
    topGlossSensor01->airProfileCompOn = 1 (for Top Gloss)
    bottomGlossSensor01->airProfileCompOn = 1 (for bottom Gloss)
    optipakSensor01->opacityAirProfileCompOn = 1 AND
    optipakSensor01->brightnessAirProfileCompOn = 1 (for OptiPak)

2. If this is to be the normal mode of operation, save the flag settings using the *gstore* utility. The frame graph should be saved.

Measurement Setup

Digital Input Invert Adjustment for the Smoothness Sensor

The first Smoothness sensor on the Scanning Platform (smoothness Sensor A01) must have the two digital inputs for temperature alarm and validity, inverted before being processed by the MPRC software. To do this, proceed as follows:

1. Activate the *dim* utility.

2. Select the digital inputs for the **ucGeneral** board.

3. Invert bit 0 by pressing **i**, then **0**, then <return> twice.

   Observe that the Invert bit gets set and that the value changes to a 1.

4. Repeat step 3 for bit 1.

5. Press **q** and respond affirmatively when asked if the mask changes are to be used.

6. Press **q** repeatedly until $$ prompt returns. Do a *gstore* to the **io** community to save the information.

Default Compensations for IR Moisture, Microwave, & Ash Sensors

IR Moisture, Microwave, and Ash sensors are dependent sensors requiring compensation from other process parameters. The requirements for each sensor are as follows:

Table 6-29 Default Compensation Requirements

Dependent Sensor	Compensation Required
IR Moisture Sensor	Basis Weight (in 2-Filter mode)
	Ash (in HemiPlus mode)
Microwave Sensor	Basis Weight
	Sheet Temperature (optional)
Ash Sensor	Basis Weight
	Moisture

Each of these sensors must have their compensating input values established within the Host Computer Grade File for each customer grade, even if the sensor has been configured to use the internal (measured) value for its compensation. This is so that, if the internal (measured) value becomes unavailable for one reason or another, there will be a reasonable compensation signal available for the dependent sensor coming from the Grade File. Refer to the Host computer documentation for details on setting up the respective Grade Files.

Calibrate Sample - Minimum Time Data Accumulation

The Calibrate Sample function provides a real-time report of the active measurement performance of all the operational sensors on the Scanning Platform. The data collection operates in parallel with the normal measurement processing taking place so that there is no interference with data being delivered to the host computer system. The Calibrate Sample procedure is available any time the measurement head is on-sheet and measuring.

There are two methods of operation:

- Holding the Calibrate Sample push button down for the duration of the data collection. The Calibrate Sample push button is the "scissors" push button located on the Frame Control Panel. You can hold down the push button for as long as desired, with no upper limit.

- Press and release the Calibrate Sample push button and allow the internal timer to dictate the duration of the data collection.

  The default time in the *inspect* utility shows up as a 0, which the system converts to a minimum time of five seconds. To make this time longer, follow the steps below:

  1. Activate the *inspect* utility.

  2. Check the current minimum Calibrate Sample time by typing:

     fhi01→ calSampMinTime

     If a 0 or less than 5, the minimum time will be five seconds.

  3. Enter in the desired minimum sample time:

     fhi01 → calSampMinTime=xx

     Where: *xx* is any time greater than five seconds.

  4. Verify the change by placing the head on-sheet and measuring. Then, press and release the Calibrate Sample push button. The push button LED should remain lit for the time just entered in Step 4 plus a five-second settle time.

  5. Save the change by performing a *gstore* to the Frame Human Interface Community (fhi01).

Blank Page

7

Control Panel Operation

The basic operations of the Scanning Platform are managed by the control panel. This chapter describes the operations that can be performed using the control panel.

This chapter contains the following major sections:

Control Panel Description

The control panel consists of a covered key pad with 12 keys and two sensor shutter
indicator lights. A control panel is located on each end column of the Scanning
Platform. Refer to the control panel in Figure 7-1.
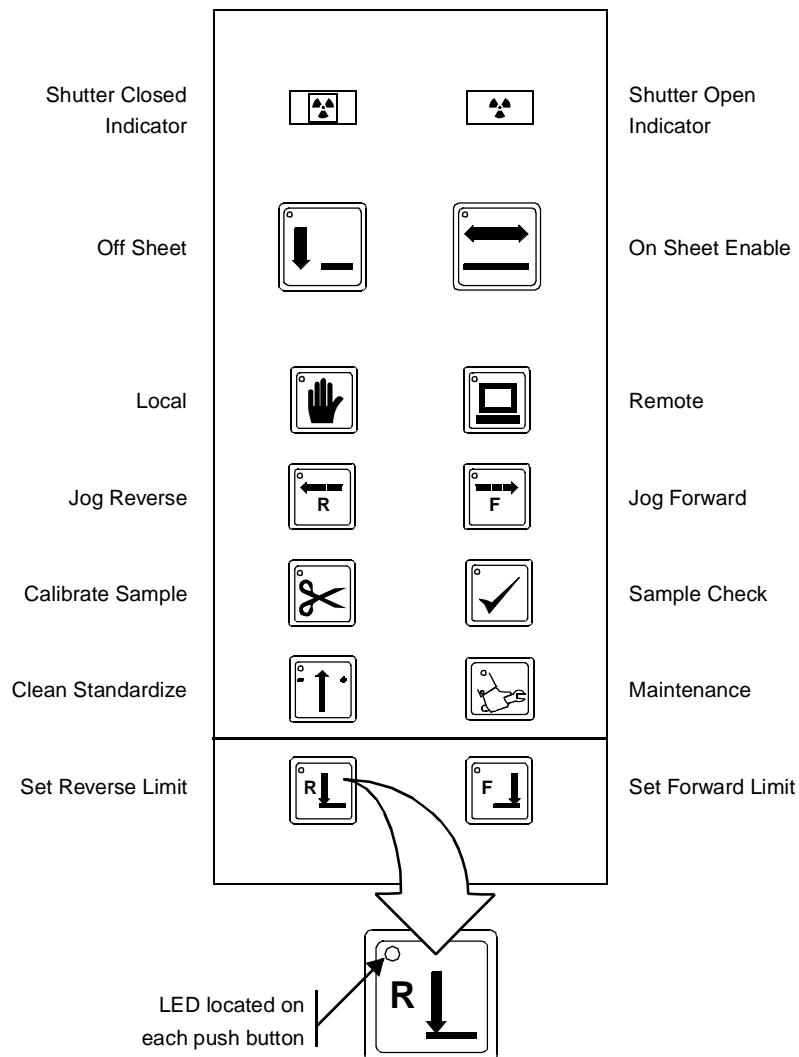
Figure 7-1 Scanning Platform Control Panel

When a control panel push button has been pressed, the request is acknowledged
by a small LED located in the upper left corner of the button, as shown in
Figure 7-1. For some control panel push buttons, the LED will remain on while the
push button is being pressed or while a function is being performed. For other
control panel push buttons, the LED will remain on until another push button has
been pressed, placing the Scanning Platform in another mode.

Scanning Platform Modes of Operation

The control panel has four modes of operation that allow different levels of Host computer control. The control panel's modes of operation are described below.

Remote/On-Sheet

In the Remote/On Sheet mode, the Host computer has total control of the Scanning Platform. The Host computer is able to request the Scanning Platform to measure, standardize, or other remote operations.

While the Scanning Platform is in the Remote/On Sheet mode, the REMOTE and ON SHEET push button LEDs are on.

Remote/Off-Sheet

In the Remote/Off-Sheet mode, the Scanning Platform is still communicating with the Host computer system, but it will refuse any Host requests to measure or standardize, but permits sample check.

While the Scanning Platform is in the Remote/ Off–Sheet mode, the REMOTE and OFF SHEET push button LEDs are on, and the sensor head package is in the off-sheet position on the Scanning Platform.

When a sheet break is detected on the paper machine, the sensor shutters close, the sensor head package moves to the off–sheet position, and the Scanning Platform enters the Remote/Off–Sheet mode automatically. Head tracking errors, inherent sheet break, and AEOS errors will also cause the platform to automatically enter the Remote/Off–Sheet mode.

The Scanning Platform must be in the Remote/Off–Sheet mode to perform sensor sample checks. While in the Remote/Off–Sheet mode, the STANDARDIZE push button on the Scanning Platform control panel is enabled, but any standardize results will be reported through the Service Workstation, not the Host computer.

Local

In the Local mode, all communications with the Host computer are disabled. The sensor shutters will not open and the Scanning Platform will not scan.

When the Scanning Platform is in the local mode, the LOCAL push button LED is on and the On Sheet and Off–Sheet LEDs are off.

The Local mode enables the control panel JOG and SET SCAN LIMIT push buttons.

Local/Head Split

In Local/Head Split mode, all communications with the Host computer are disabled, and the Scanning Platform drive mechanism is disengaged.

The Scanning Platform enters Local/Head Split mode when the drive clutch is disengaged by the head split switch located in each of the Scanning Platform end columns. The Scanning Platform also enters this mode when the air supply to the air clutch drops below the correct pressure.

Since the drive mechanism is disabled in local/head split mode, the sensor head package can only be positioned by hand.

Control Panel Functions

The functions of each of the control panel push buttons is described below.

Off-Sheet

If the Scanning Platform is in remote, pressing the OFF SHEET push button places the Scanning Platform in Remote/Off–Sheet mode.

If the OFF SHEET push button is pressed while the Scanning Platform is scanning or standardizing, the sensor shutters close and the head package moves to the off–sheet position.

On-Sheet

If the Scanning Platform is in remote, pressing the ON SHEET push button places the Scanning Platform in Remote/On Sheet mode. When the ON SHEET LED is lit, it permits the Host to direct the head to standardize or measure.

Local

Pressing the LOCAL push button places the Scanning Platform in Local mode.

If the Local push button is pressed while the Scanning Platform is scanning or standardizing, the sensor shutters close and the head package remains in place.

Remote

Pressing the REMOTE push button places the Scanning Platform in Remote/Off-Sheet mode, if the Scanning Platform is currently in Local mode.

Jog

The JOG push buttons are used to position the sensor head package manually, anywhere between the mechanical limit switches of the Scanning Platform. The FORWARD JOG push button (**F**) moves the head package towards the far side end column. The REVERSE JOG push button (**R**) moves the head package toward the home end column.

The JOG push buttons only function when the Scanning Platform is in Local mode.

Calibrate Sample (Sample Cut)

While the CALIBRATE SAMPLE push button is pressed, the Scanning Platform begins a special accumulation of measurement single point or profile data. When the push button is released, this data is forwarded to the Host computer where a Calibrate Sample report is printed.

The CALIBRATE SAMPLE push button LED is on while the measurement data is being accumulated, and while the data is being sent to the Host computer.

The CALIBRATE SAMPLE push button functions only when the Scanning Platform is measuring in the Remote/On Sheet mode and the sensor is in the measurement mode, either scanning or in single point.

Sample Check

The SAMPLE CHECK push button requests the sensors to take a sample check measurement. The push button LED is on while the measurement is being taken.

The SAMPLE CHECK push button operates only if the Scanning Platform is in the Remote/Off-Sheet mode. No report will be sent unless the Sample Check mode is enabled at the Host computer. However, a local report is available through the Sensor Health Report.

Standardize

Pressing the STANDARDIZE push button requests the sensors to perform a standardize. The standardize will be either CLEAN or DIRTY depending on the setting of the *localStdzType* instance variable in the **fhi01** object. The push button LED is lit during the standardize cycle. If any of the sensors fail the standardize, the LED flashed until the sensors all pass standardize. Standardize reports are available through the HOST display, or through the HEALTH REPORTS at the Service Workstation.

The sensors will do a CLEAN or DIRT standardize depending on the state of the defaultStdzType flag associated with each sensor object. If the flag is a "0", the standardize will be a DIRT one. If the flag is a "1", then the standardize will be a CLEAN one. The only sensors affected by a CLEAN or DIRT request are Basis Weight, Caliper, and OptiPak. For the other sensors, this discussion is irrelevant. They will do their normal standardize no matter what the flags are set to.

It is possible to temporarily change the Control Panel default standardize mode from DIRT to CLEAN by setting the **localStdzMode** flag in the fhi01 object to a "1" This assignment is set back to DIRT ("0") automatically at the next restart.

Self Test

The Self Test push button serves as a lamp test for the LEDs on the panel, as well as being able to initiate a check on the positioning subsystem operation when the scanner is in the LOCAL mode. In all scanner modes except LOCAL, when the Self Test push button is pushed, the various LEDs on the panel will sequentially light up momentarily to indicate their condition. This test has no impact on what other functions the scanner is performing at the time.

When the scanner is in LOCAL, the function of the Self Test push button changes to include a check on the positioning subsystem. Under the LOCAL condition, the initial push of the button will start the usual LED lighting cycle, but when released, the OFF SHEET LED will extinguish and the scanner will attempt to resynchronize the encoder. The following sequence will take place.

- unsynchronizes the encoder

- moves the head package to the home limit switch

- resynchronizes the encoder

- moves the head package to the off-sheet position

Note: The test can be started with the head located anywhere along the frame. When the test starts the head will move toward the home limit switch at a high slew rate. If there is a need to stop the head at any time during this transition, simply press the LOCAL push button once more, stopping the head. This will terminate the self-test request.

The actual check being performed in this test, is to verify that the encoder count at the point of the head coming off the limit switch, matches the count when the encoder was initially synchronized. Any error in this will result in the push button LED flashing. In this case, run the test again to clear the alarm and check the Encoder Diagnostic screen in the ft utility to see the details of the encoder's history. It is possible that the test failure may only be the result of the system having lost some counts during an earlier scan. In that case, the Encoder Diagnostic screen should be visited periodically to make sure that the condition is not a chronic one. Some things which can cause failure are:

- Scanning too fast (can lose encoder counts)

- Defective encoder

- Defective encoder mounting (slipping)

- Defective cabling from encoder to the ECF board

- Defective ECF board

R↓   **F↓**   # Scan Limit Set

The LIMIT SET push buttons set the measured sheet edge limits for Smart Platforms without auto edge–of–sheet (AEOS) or when AEOS is disabled.

The FORWARD LIMIT button (**F**) sets the limit near the drive (far) end column of the Scanning Platform. The REVERSE LIMIT button (**R**) sets the limit near the idler (home) end column.

The LIMIT SET push buttons are enabled only when the Scanning Platform is in Local mode.

Head Split Switches

To gain access to the sensors mounted in the Scanning Platform head package, a head split switch is located in each end column, as shown in . The switch, when activated, disengages the motor drive clutch and allows the top and bottom sensor heads to be separated.

Drive End   **Idler End**
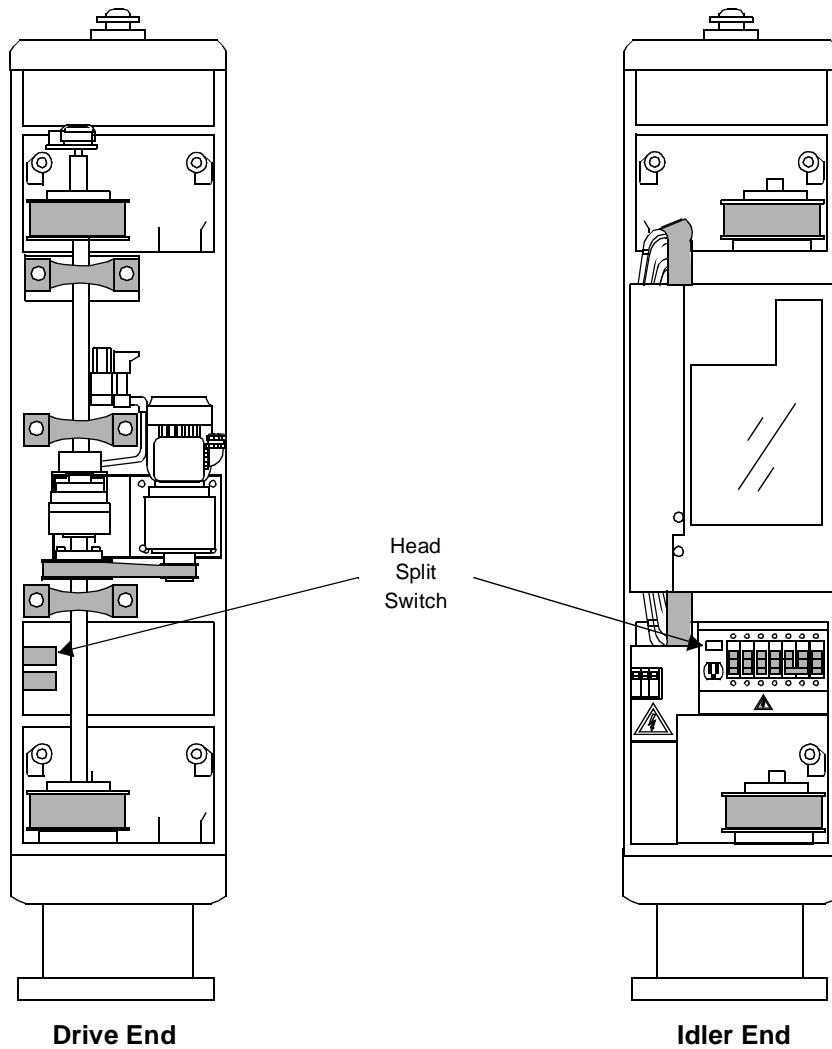
Figure 7-2 Locations of the Head Split Switches

When the sensor heads are split, the Scanning Platform is placed in Local mode, and the sensor heads can only be moved by hand.
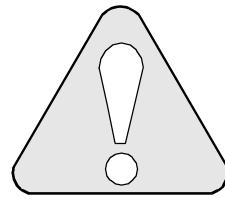
Make certain the sensor heads are properly aligned
before re–engaging the clutch. Aligning the sensor
heads is mandatory to assure the radiation beam is
directed to its proper target.

In Local/Head Split mode, all communications with the Host computer are disabled, and the Scanning Platform drive mechanism is disengaged.

The Scanning Platform enters Local/Head Split mode when the drive clutch is disengaged.

Make sure the sensor heads can be separated by manually moving the bottom head. Since the drive mechanism is disabled in Local/Head Split mode, the bottom sensor head package can only be positioned by hand.

8

Startup Options

There are two startup options available to the user, one requires manual intervention after the reset is initiated, and the other is automatic in that the startup sequence will proceed automatically after a power reset or a manual reset request. It is recommended that the switch be left in the automatic startup position. The manual position is used primarily for troubleshooting activities.

This chapter contains the following major sections:

Manual Startup

The following procedure involves manual intervention via the console keyboard after reset has been initiated. It also enables reporting of conditions resulting in an OFFLINE DEBUG status of the software.

1. Place the START MODE switch on the MPRC front panel to the STOP/DEBUG position (down).

2. Either press the RESET switch on the MPRC front panel, or type **reset** on the console keyboard (Scanning Platform window open).

3. For non-Ethernet MPRC Boards (086349-002):

    When the console responds with OFFLINE DEBUG, enter a **g** {CR}.
    For Ethernet MPRC Boards (086444-xxx):

    When the console responds with OFFLINE DEBUG, place the START MODE switch back to the center position, then enter a **g** {CR}.

4. The system will proceed with the startup and loading activity after about a 15-second delay for diagnostic checks.

5. In less than a minute, the console should display the startup completion banner which gives the download instructions from the Host computer. Execute the **PMMRLD** command directed by the Host computer.

6. The Host computer download activity will result in three messages:

    pmmFrame01: HOST TO AMS DOWNLOAD IN PROGRESS.
    pmmFrame01: HOST TO AMS DOWNLOAD COMPLETED.
    pmmFrame01: HOST COMMUNICATIONS ESTABLISHED.
    If the download activity is not started, the console will eventually respond with:
    pmmFrame01: HOST COMMUNICATIONS TIMEOUT.

Automatic Startup

This method of startup will automatically restart the Scanning Platform MPRC board in the case of a power reset or a manual reset request.

1. Place the START MODE switch on the MPRC front panel to the Short Diag position (middle).

2. Either press the RESET switch on the MPRC front panel, or type **reset** on the console keyboard (Scanning Platform window open).

3. The system will proceed with the startup and loading activity after about a 15-second delay for diagnostic checks.

4. In less than a minute, the console should display the startup completion banner which gives the download instructions from the Host computer. Execute the **PMMRLD** command as directed by the Host computer.

5. The Host computer download activity will result in three messages:

   pmmFrame01: HOST TO AMS DOWNLOAD IN PROGRESS.
   pmmFrame01: HOST TO AMS DOWNLOAD COMPLETED.
   pmmFrame01: HOST COMMUNICATIONS ESTABLISHED.

   If download activity is not started, the console will eventually respond with:

   pmmFrame01: HOST COMMUNICATIONS TIMEOUT.

Service Workstation Software Startup

Refer to one of the following *Scanning Platform System Software* manuals for the appropriate procedure:

- *3BUS 208 051 RXX01* - SP280.0 & Later (MPRC Boards 086349-xxx)

- *3BUS 208 052 RXX01* - SP300.0 & Later (MPRC Boards 086444-xxx)

- *3BUS 208 053 RXX01* - SP300.0 & Later (MPRC Boards 086444-xxx & NT)

- *3BUS 208 054 RXX01* - SP280.0 & Later (MPRC Boards 086349-xxx & NT)

9

Maintenance Procedures

This chapter contains the following major sections:

Scanning Platform Maintenance Log

(Initial Maintenance)

START DATE: _____

MAINTENANCE ITEM	SCHEDULE (WEEKS)											
	1	2	3	4	5	6	7	8	9	10	11	12
DRIVE CHECKS												
1. Check upper/lower drive belts with tensiometer. ①												
2. No evidence of wear or cracks in belts												
3. Motor Drive Belt Tension (Tight enough to eliminate possibility of the belt derailing)												
4. Upper/lower Seal Belt Tension (uniform seal provided and no gaps in seal exist) ②												
5. Head Separation Clutch Operation												
WHEEL CHECKS												
1. Upper/lower Carriage Wheels												
2. Upper/lower Seal Belt Roller Assembly												
ALIGNMENT CHECKS												
1. Air Profile Check ③												
2. Scan Direction Alignment												
UTILITY CHECKS												
1. Air Purge Filter												
2. Compressed Air Filters												
3. Water Filter												

① Check upon replacement and at three weeks after replacement.

② Check upon replacement and at one week after replacement.

③ Check at four week intervals when the process is not running.

Scanning Platform Maintenance Log
(Subsequent Maintenance Log)

START DATE: _____

MAINTENANCE ITEM	SCHEDULE (MONTHS)											
	1	2	3	4	5	6	7	8	9	10	11	12
DRIVE CHECKS												
1. a. Check upper/lower drive belts with tensiometer. b. Check pulleys for lubrication c. Check belt tracking on page 178. ①												
2. No evidence of wear or cracks in belts												
3. Motor Drive Belt Tension (Belt should deflect .12 - .25 in. (3.0 – 6.3 mm) with finger pressure)												
4. Upper/lower Seal Belt Tension (uniform seal provided and no gaps in seal exist) . See page 181. ②												
5. Head Separation Clutch Operation/lubrication. See page 182.												
WHEEL CHECKS												
1. Upper/lower Carriage Wheels												
2. Upper/lower Seal Belt Roller Assembly												
ALIGNMENT CHECKS												
1. Air Profile Check ③												
2. Scan Direction Alignment												
UTILITY CHECKS												
1. Air Purge Filter. See page 186. ④												
2. Compressed Air Filters. See page 188. ④												
3. Water Filter. See page 189. ④												

① Check upon replacement and at three weeks after replacement.
② Check upon replacement and at one week after replacement.
③ Check at one month intervals when the process is not running.
④ Schedule for maintenance depends upon installation circumstances and mill conditions.

Inspecting the Incoming Power

Verify the presence of incoming power at the idler end column. The power for the Scanning Platform comes through a transformer. The voltage to the transformer must be of a nominal level (200, 208, 220, 230, or 240 volts) to connect to one of the taps on the primary. The long-term variations from the nominal voltage must not exceed ±10%.

Example: A 220 volt primary voltage must not average less than 198 VAC or greater than 242 VAC for longer than one second.

Inspecting the Drive System

The drive system consists of several belts that must be checked periodically for proper tension and damage or defects. Complete the following procedures to perform the drive checks.

When performing any maintenance operation in the carriages, always lock out the drive motor power using the lock-out switch at the drive end column. Refer to Figure 9-1.

MOTOR ONLY
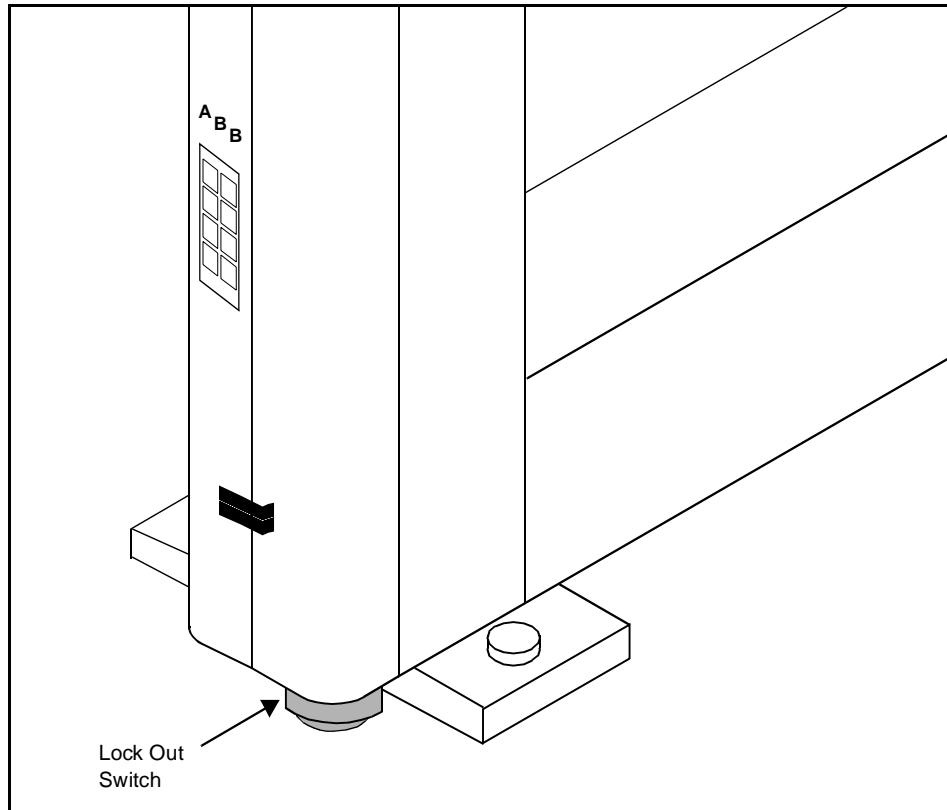
Lock Out Switch

Figure 9-1 Scanning Platform Lockout Switch Location

Drive Belt Tension Measurement

Inspect the tension of the upper and lower drive belts. They should be the same. Perform the belt tension check as follows:

1. Squeeze the handle of the tension gauge and place it on the drive belt making certain that the pivot arm is centered on the belt during adjustment.

   The gauge must be applied to the portion of the carriage drive belt that traverses the Scanning Platform.

2. Release the handle and read the tension indication on the gauge. The tension should be in the range specified on the gauge.

3. If the tension is outside of that range, adjust the idler pulley tension adjustment screws until the tension is proper.

4. Tighten the adjustment lock when finished.

Drive Belt Tension and Tip Adjustment

Refer to Figure 9-2.

Observe the idler pulleys on the Scanning Platform while the sensor heads are scanning. If the drive belt climbs up or down on the idler pulley, adjust the pulley tip by completing the following steps:

1. Loosen the tip adjustment lock.

2. Tighten the tip adjustment if the belt tracks to the upper edge of the pulley.

3. Loosen the tip adjustment if the belt tracks to the lower edge of the pulley.

4. Observe the idler pulleys while the sensor heads are scanning. If the drive belt climbs up or down on the idler pulley, repeat Step 2 or 3.

5. Tighten the tip adjustment lock.

Top View
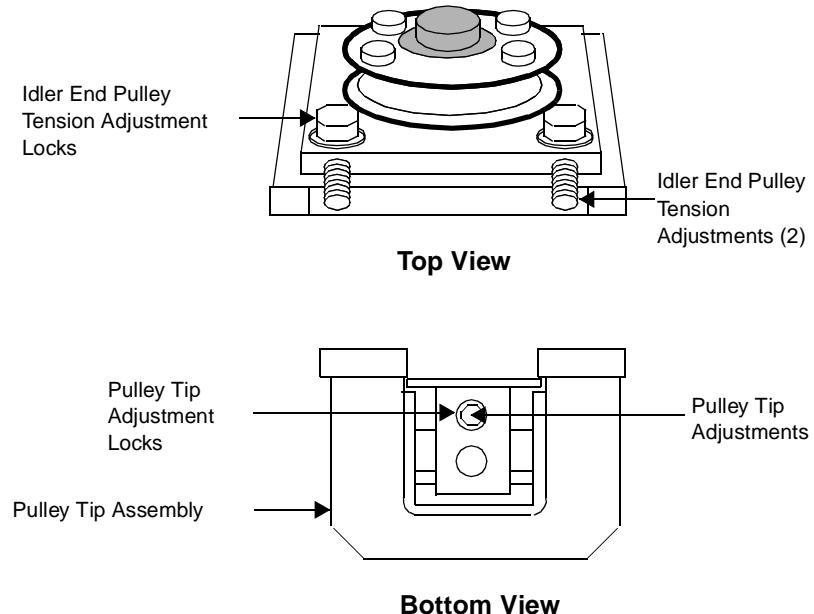
Bottom View
Figure 9-2 Drive Belt Measurement and Adjustment

Drive Motor Belt Inspection

Refer to Figure 9-3.

1. Inspect the upper and lower drive belts for evidence of wear or damage.

2. If either the upper or lower drive belt exhibits serious cracks, replace both drive belts. Replacing both belts will prevent uneven wear of the belts. Cracks may indicate a future failure of the drive belt.

3. Inspect the tension of the drive motor belt by pressing it with your finger. If a deflection greater than 0.25 in. (6 mm) occurs, adjust the drive motor position.

Drive Motor Adjustment

1. Loosen the four drive motor/gear box mount adjustment bolts.

2. Slide the assembly away from the drive shaft to tighten the belt.

3. Tighten the assembly while keeping tension on the belt. The assembly should remain parallel to the drive shaft at all times.

4. Inspect the drive motor belt for evidence of wear and cracks.

5. Replace belts that have evidence of wear or cracks.

Note: A spare belt can be attached to the shaft with tie wraps or heavy-duty tape to make future service easier.
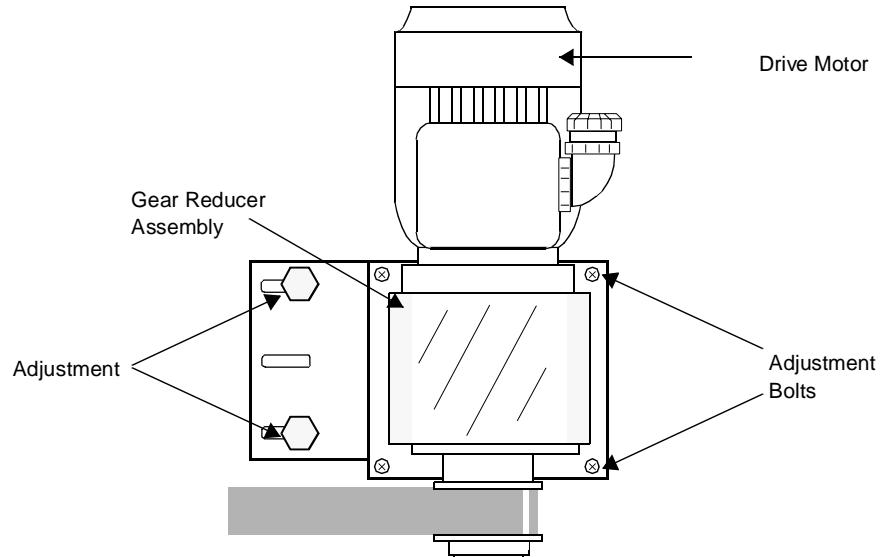
Figure 9-3 Drive Motor Belt Check and Adjustment

Seal Belt Tension Inspection

Inspect the seal belts. The seal belts must have enough tension so that a seal is present along the length of the platform but not too much so that the carriage seal belt roller is deflected up causing a break in the cable seal. Refer to Figure 9-4. The tension on the seal belts must be even on each side of the belt. If this is not the case, the carriage seal belt roller will be deflected up on one end.
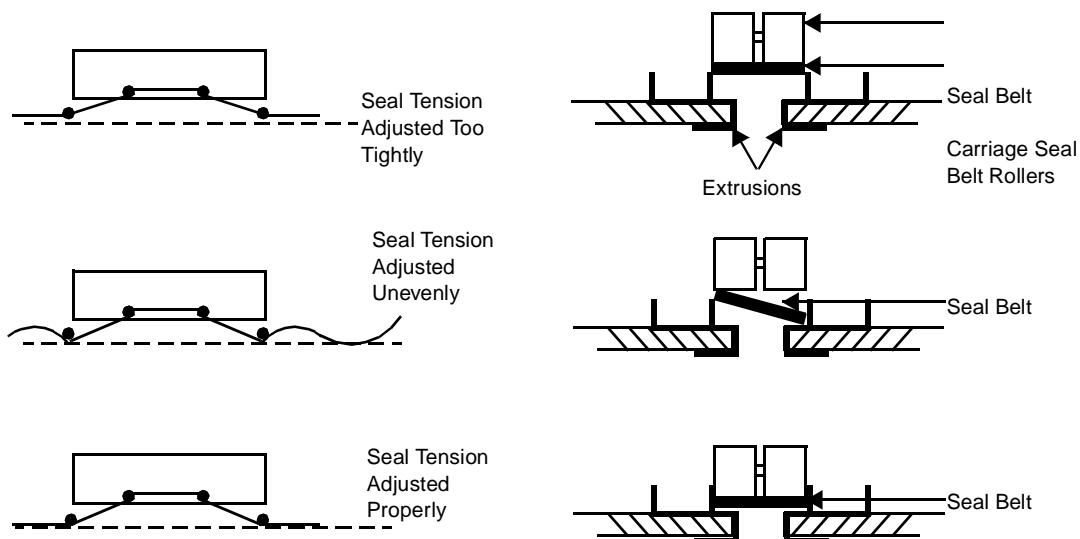
Figure 9-4 Seal Belt Tension Checks

Seal Belt Tension Adjustment

Refer to Figure 9-5.
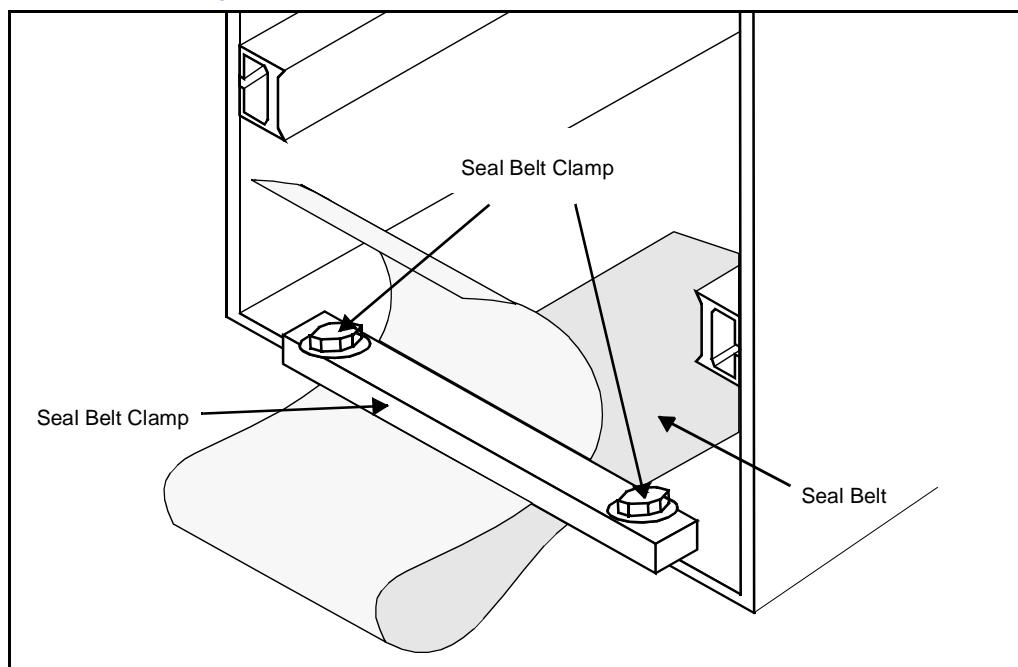
Figure 9-5 Seal Belt Adjustment

1. Inspect the seal belts for evidence of wear or cracks. Replace belts that have evidence of wear or cracks.

2. Inspect the seal belt rollers for evidence of cracks or wear.

3. Inspect the spring tension on the seal belt rollers. The roller assembly should exert some downward force when manually lifted. If this does not happen, the roller assembly should be replaced.

If the seal belt tension is uneven, adjust the tension of the seal belt as follows:

1. Loosen the seal belt clamp adjustment corresponding to the side that is elevated by a slight amount.

2. Tighten the clamp when finished.

If the belt tension is too tight at both sides:

1. Loosen the seal belt clamp adjustments and pull the seal belt evenly in the cross–machine direction to result in a uniform decrease in tension.

2. Tighten the clamps when finished.

If the belt tension is too loose:

1. Loosen the seal belt clamp and pull the seal belt through the clamp in the cross–machine direction evenly to result in a uniform increase in tension.

2. Tighten the clamp when finished.

Head Separation and Limit Switch Inspection

Refer to Figure 9-6 on page 183. Verify the operation of the head separation clutch by completing the following:

1. Move the sensor head package to the off-sheet position.

2. Place the platform in Local by pressing the LOCAL push button on the control panel.

3. Verify that the shutter closes on the Basis Weight and Ash sensors.

4. Activate the head separation switch located at either end of the Scanning Platform in the service outlet box.

5. Make sure the sensor heads can be separated by manually moving the bottom head.

6. Move the sensor heads back as close as possible to their original position.

7. Return the air clutch swith to its original position.

8. Manually position the sensor heads to make sure the air clutch has been properly seated and locks when the proper position is reached.

9. Return to the normal system operation.

10. Manually jog the sensor package to the drive and idler ends slowing the rate of travel as they reach the end of the platform.

11. Verify that the drive motor stops when the limit switch is tripped.
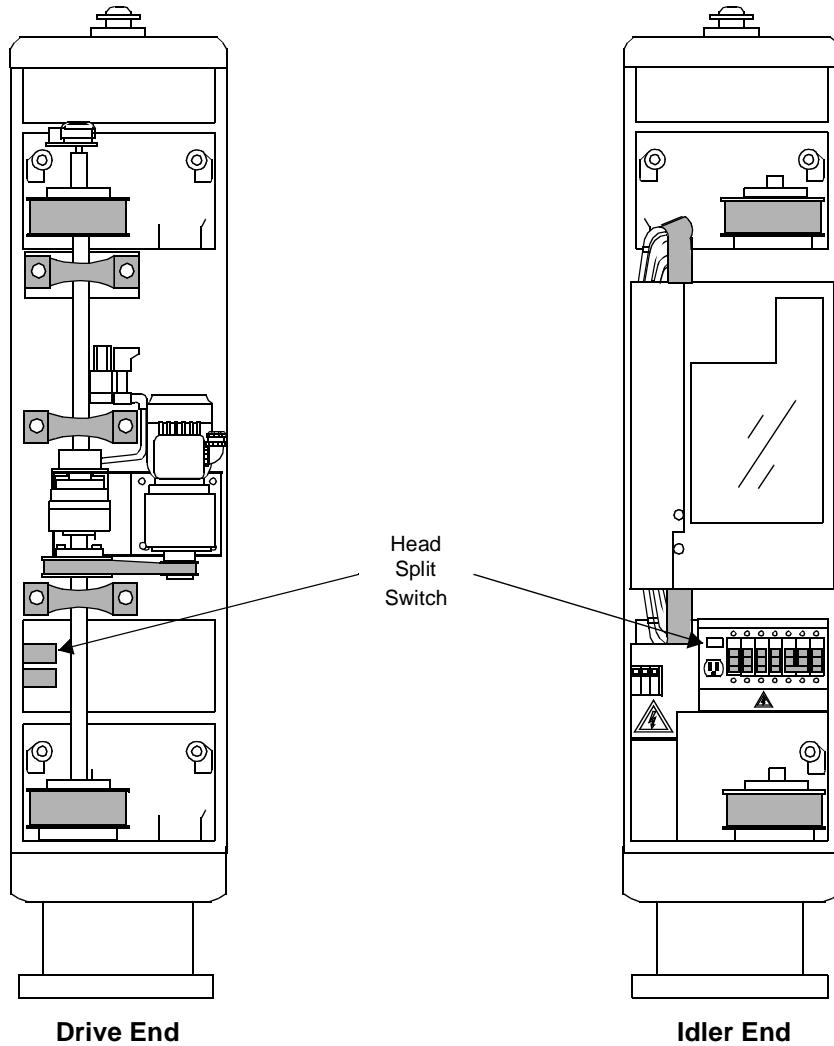
Figure 9-6 Head Separation Switches

Wheel Inspection

The carriage wheels should be checked periodically for wear or damage in the material. Complete the following steps to check the carriage wheels:

1. Put the Scanning Platform in Local mode.

2. Jog the sensor package to the drive end of the Scanning Platform so that the carriage wheels are visible at that end.

3. Check for proper wheel and way bar contact.

4. Jog the sensor package slightly to inspect portions of the wheel that are hidden by the carriage.

5. Replace carriage wheels that exhibit wear or damage.

6. Jog the sensor package to the idler end of the Scanning Platform so that the carriage wheels are visible at that end.

7. Check for proper wheel and way bar contact.

8. Jog the sensor package slightly to inspect portions of the wheel that are hidden by the carriage.

9. Replace wheel assemblies that exhibit wear or damage.

MOTOR ONLY

When performing maintenance operations to the carriage or platform, always lock out the drive motor power on the lock–out switch at the drive end column.

Platform Alignment Inspection

The alignment inspection recommended for the Scanning Platform consists of running an air profile at four-week intervals during a time when the process is not running. Complete the following to perform an air profile:

1. Scan the sensor package with at least ten scans without the process in the gap. The composite profile weighting factor should be set up for 10 scans.

2. Select and observe the Basis Weight profile on the video monitor.

3. Compare the profile to the profile taken at installation. They should not differ more than 0.1 grams per square meter (g/m^2). Consult your measurement specialist if the profiles differ more than this amount.

Air Purge Filter Inspection

The Scanning Platform requires a constant flow of filtered air to keep the electronics and mechanisms at a safe temperature and to prevent contaminants from entering the sealed platform.

If the platform is utilizing DC motor cooling air from the mill air system, there are no extra filters needed.

If the platform is using the ABB supplied high capacity purge blower (Part Number 101495-006, the filters need to be cleaned periodically to maintain good air flow. The frequency of cleaning the filters depends upon mill conditions. The presence of good air flow is easily detected by opening the doors on the idler side of the Scanning Platform.

The high capacity purge blower is intended to provide better SP Frame reliability under all environmental conditions. The circuit breaker is rated at 15.0A for the high capacity purge blower. The high capacity purge blower draws between 5 and 9 AMPs at 230 VAC during normal operation. The highest current will be observed when the damper is fully open.

Purge Blower Replacement Process

Note: Purge blowers used before October 1995 used a low capacity purge blower, Part Number 101495-003. This item is no longer being used. A high capacity purge blower, Part Number 101495-006 is now being shipped and replaces the low capacity purge blower.

If the low capacity purge blower fails, you will need to order the high capacity blower assembly. The following assemblies are available for specific application requirements:

- 123595-008   Purge Blower Assembly without cabinet and with High Capacity Purge Blower
- 127323-011   Blower Assembly without cabinet and with High Capacity Purge Blower
- 127323-012   Blower Assembly with stainless steel cabinet and High Capacity Purge Blower

Note: Some earlier shipments of the high capacity purge blower contained the wrong circuit breaker. If you replaced the low capacity purge blower with the high capacity purge blower, check the circuit breaker for the correct rating. If you are experiencing startup or run trips, check the circuit breaker rating. If incorrect, order the correct rating, 15.0 A, ABB Part Number 014847-108.

Cleaning the Air Purge Filter

Cleaning the Air Purge Filter depends on the paper dust levels. If there is a high level of dust, the filter should be checked and cleaned at least once a day. If there are lesser amounts of paper dust, then the interval should be a minimum of every other day.

If the Air Purge Filter requires frequent cleaning, you might consider relocation of the blower to a cleaner environment. Failure to check and clean the filter will cause premature failure of the purge blower motor and frame down time.

1. Turn off power to the purge blower using the switch on the blower.

2. Turn off the power at the power distribution center.

3. Remove the cylindrical fiber filter.

4. Blow compressed air into the inside of the filter to clean it.

   If the metal screen filter is also dirty, clean it the same way.

5. Replace the filter. Restart the blower.

Note: Keep the Scanning Platform well sealed and the doors fully closed at all times, except during maintenance. Positive air flow is required for reliable operation.

Inspecting the Compressed Air Filters

The Scanning Platform requires good quality compressed air. Air pressure to the platform must never be below 4.5 bar (65 psi). Contaminants are filtered through the incoming air filters. The frequency with which the compressed air filters are changed depends upon the amount of contaminants in the mill air supply and the type of filter used. Inspect the filter once a week for the first three weeks to gauge the frequency that the filter needs to be cleaned.

Cleaning the Compressed Air Filter

1. Press the OFF SHEET push button on the control panel.

2. Turn off the main AC circuit breaker at the Scanning Platform idler side power entrance module.

3. Turn off the main air valve.

4. Replace or clean the filter.

5. Turn on the main air valve.

6. Turn on power to the platform. Wait five minutes for stabilization, then perform a standardize.

Inspecting the Water Filter

The maintenance schedule for the water filter will depend upon the amount of contamination in the cooling water supply. Inspect the filter once a week for the first three weeks to gauge the frequency that the filter needs to be cleaned. Follow the procedure below for maintenance to the water filter.

1. To perform maintenance that will take two hours or more, turn off the main AC circuit breaker.

2. When maintenance will be less than two hours, keep the Liquid Cooling Unit (LCU) pump running and the platform scanning, while temporarily shutting down the mill water supply for filter replacement.

The replacement procedure for the water filter will depend upon what type of unit was purchased.

Power and Temperature Checks

Prepare weekly reports on the system power and board temperatures. Use the Voltage and Temperature History tab of each sensor's Health Report to print the last 20 occasions of DC power levels and cabinet temperatures (see Figure 9-7). Keep the weekly reports in a log for future reference.

Basis Weight Sensor Health Report

Measurement | Alarms | Heater | Voltage and Temperature History

Date	Time	Temp °C	Reference	+15V	-15V	Therm Ref
Apr 25	09:47	25.9	4.50	15.03	-14.97	4.50
Apr 25	09:48	26.3	4.50	15.04	-14.97	4.50
Apr 25	09:56	26.7	4.50	15.04	-14.97	4.50
Apr 25	16:00	27.0	4.50	15.04	-14.97	4.50
Apr 26	16:02	26.5	4.50	15.04	-14.97	4.50
Apr 27	16:05	26.4	4.50	15.04	-14.97	4.50
Apr 28	00:09	27.2	4.50	15.04	-14.97	4.50
Apr 28	12:43	26.9	4.50	15.03	-14.97	4.50
Apr 28	12:46	26.8	4.50	15.04	-14.98	4.50
Apr 28	12:50	27.0	4.50	15.04	-14.97	4.50
Apr 28	13:07	26.6	4.50	15.03	-14.97	4.50
Apr 28	16:21	27.4	4.50	15.03	-14.97	4.50
Apr 28	20:25	26.5	4.50	15.03	-14.97	4.50
Apr 24	11:27	26.9	4.50	15.03	-14.97	4.50
Apr 24	12:46	27.0	4.50	15.04	-14.97	4.50
Apr 24	13:13	27.2	4.50	15.04	-14.97	4.50
Apr 24	13:37	27.3	4.50	15.03	-14.97	4.50
Apr 24	13:45	27.5	4.50	15.03	-14.97	4.50
Apr 24	14:32	27.8	4.50	15.04	-14.97	4.50
Apr 24	20:43	26.2	4.50	15.04	-14.97	4.50

Figure 9-7 NT Workstation Sensor Health Report - Voltage/Temperature History

DC Voltage Level Checks

Check the five DC voltage levels. Perform this check at least once a month using the Electronics portion of the Health Report. They report the number of times each day that the DC voltages exceeded their tolerance limits. The limits are checked on the hour, each hour of the day. The limits for each voltage are as follows:

± 12 volt supply	± 0.6 VDC
+ 5 volt supply	± 0.3 VDC
± 15 volt supply	± 0.3 VDC

Cabinet Environmental Checks

Check the cabinet environmental temperature at each microcontroller board. Perform this check at least once a week using the Electronics portion of the Health Report. The report represents the maximum temperature of each shift for each day. The limits are checked on the hour, each hour of the day.

Examine the report for excessive cyclical variations or heating trends. It may be possible to correlate performance problems with heat problems.

10

Replacement Procedures

This chapter contains the following major sections:

Drive Motor Belt

Use these procedures to replace the drive motor belt. Refer to Figure 10-1 and .

1. Turn off the power to the drive motor.

2. Loosen the tension on the drive motor belt by completing the following:

   a. Loosen the four drive motor mount adjustment bolts.

   b. Slide the assembly towards the drive shaft and take the belt off of the motor pulley.
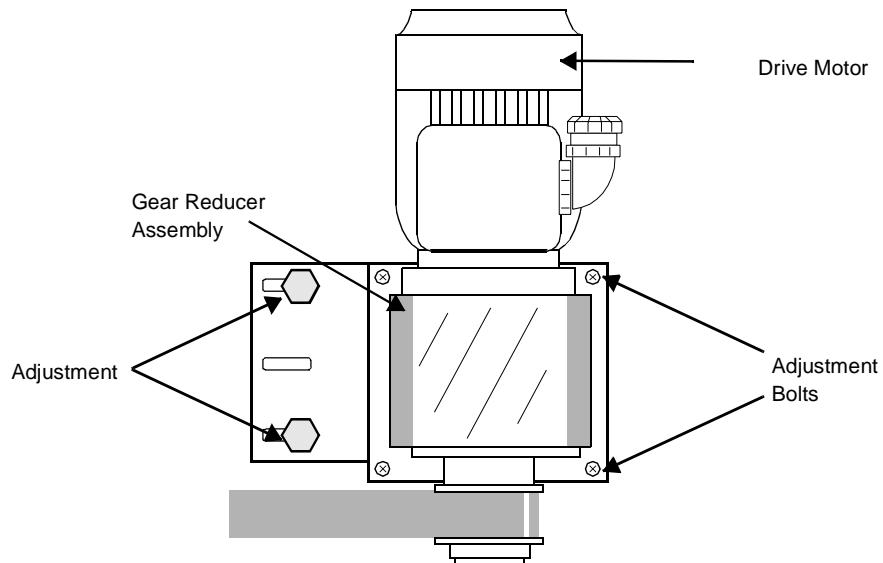
Figure 10-1 Drive Motor Belt

3. Disengage the air clutch by using the head separation switch so that the two drive shafts can move independently.

4. Remove the two metric Allen screws that hold the collar to the shaft.

5. Remove the three SAE bolts on the mating collar.

6. Remove the collar which exposes a two–inch gap between the upper and lower drive shafts to allow removal of the drive motor belt.

7. Replace the drive motor belt.

8. Adjust the tension and tighten the position adjustment bolts.

Figure 10-2 Air Clutch Drive Assembly
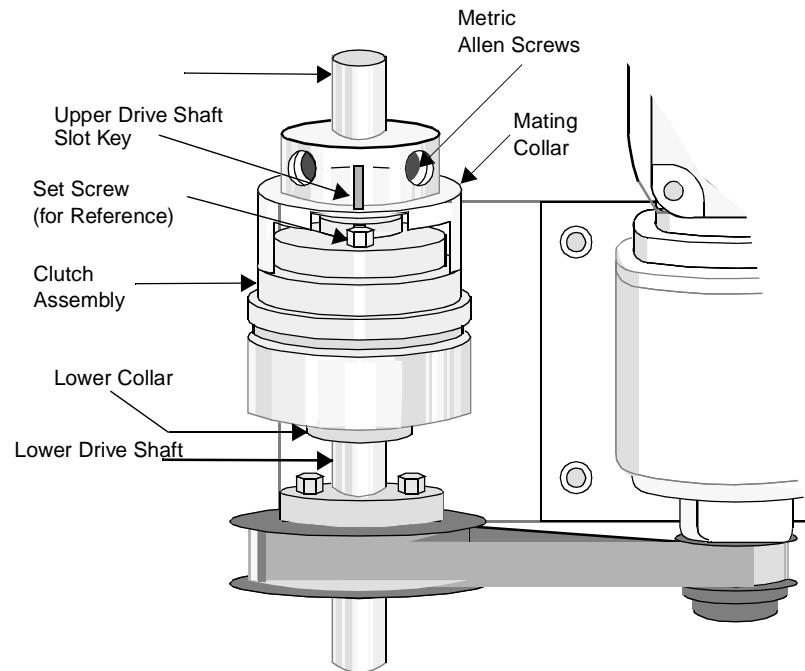
Carriage Drive Belt

Use these procedures to replace the carriage drive belt. Once this procedure is completed, perform a scan direction alignment to make certain that the sensor heads are tracking each other. Refer to . The carriage alignment in the drive direction may need to be reset.   To check the alignment, complete the .

Note: When replacing a failed belt, it is required that both top and bottom belts be replaced as a matched set. Replacing both belts at the same time maintains sensor alignment by eliminating variation between belts due to wear. In an emergency situation, it is acceptable to defer replacement of the second belt until the first scheduled maintenance shutdown.

$$Belt\ Length\ =\ 2 \times center\text{-}to\text{-}center + 8.75\ in$$

Equation 10-1 Carriage Drive Belt Equation

1. Disengage the air clutch so that the heads can be separated.

2. Turn off the power to the drive motor.

3. Move the head carriage with the defective belt to the Scanning Platform idler end column.

4. Release the belt tension by loosening the idler pulley at the Scanning Platform idler end column.

5. Remove the end of the drive belt which is attached to the idler end of the carriage assembly.

6. Attach the new belt with strong tape to one end of the old belt which was removed in the previous step.

7. Go to the drive end of the Scanning Platform and pull the new drive belt through the structure.

8. Attach the other end of the new belt to the idler end of the carriage assembly.

9. Move the head carriage to the Scanning Platform drive end, and at the same time, pull the new belt along with it.

10. Disconnect the two belts attached in Step 6. and discard the old belt.

11. Cut the new belt to a length such that when it is attached to the carriage assembly, the tension can be adequately adjusted using the idler tension adjustments.

12. Attach the remaining loose end of the new belt to the drive end of the carriage assembly.

13. Move the head with the new drive belt, center them, and engage the air clutch.

14. Tighten the new belt to 125 ± 25 pounds.

Drive End
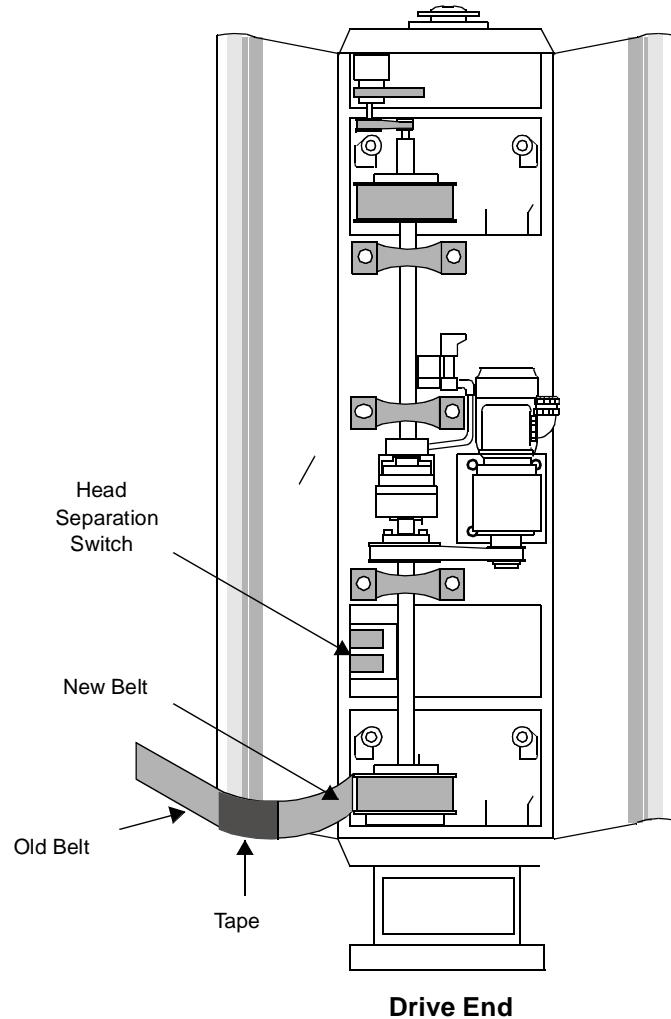
Figure 10-3 Carriage Drive Belt

Idler Pulley

Use these procedures to replace the idler pulley. Refer to Figure 10-4.
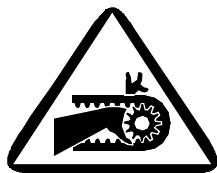
Exercise care when working with toothed belt and toothed gear equipment. Do not wear ties or loose clothing while working near equipment.

1. Turn off the power to the drive motor.

2. Loosen the idler tension adjustment locks and theidler pulley.

3. Remove the bolt that secures the pulley and lift the pulley off the shaft.

4. Replace the pulley assembly.

5. Adjust the idler tension adjustment bolts.

6. Perform the "Process Direction Alignment" on page 48.

Side View

Pulley Shaft

Drive Pulley

Top View

Pulley Tension Adjustment Locks

Drive Belt

Pulley Tension Adjustments
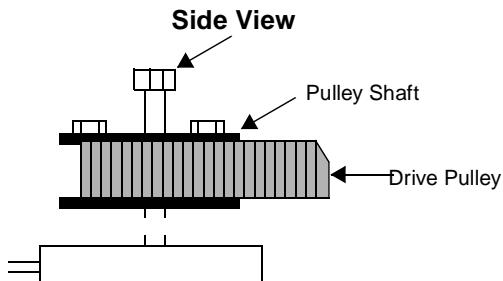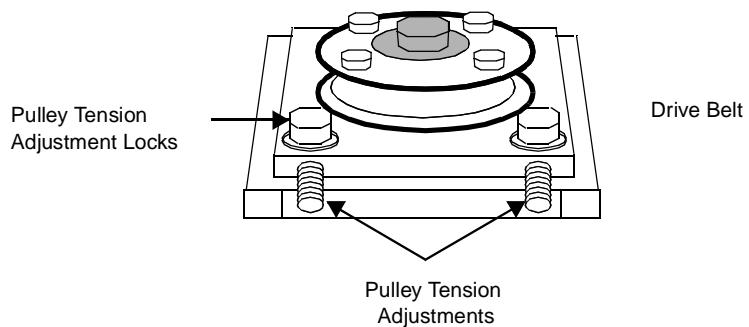
Figure 10-4 Idler Pulley

Carriage Wheel

Use these procedures to replace the carriage wheel. Refer to Figure 10-5.

1. Move carriage assembly to either the idler end or the drive end of the platform depending upon which wheels need replaced.

2. Remove the bolt(s) which hold the carriage wheel to the assembly.

3. Remove the wheel.

4. Replace the wheel and secure.
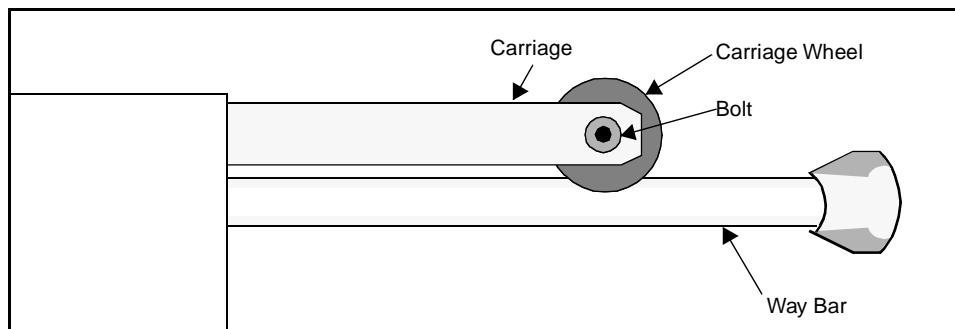
Figure 10-5 Carriage Wheel

Seal Belt

Use these procedures to replace the Seal Belt. See Figure 10-6 through Figure 10-8.
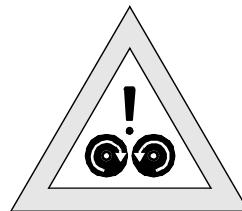
Exercise care when working with toothed belt and toothed gear equipment. Do not wear ties or loose clothing while working near equipment.
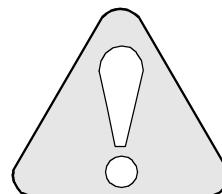
The Scanning Platform design allows replacement of this item while the customer's process is running. Exercise caution to ensure that the seal belt is kept clear of the process while being removed and replaced.

1. Loosen the seal belt clamp at the drive end.
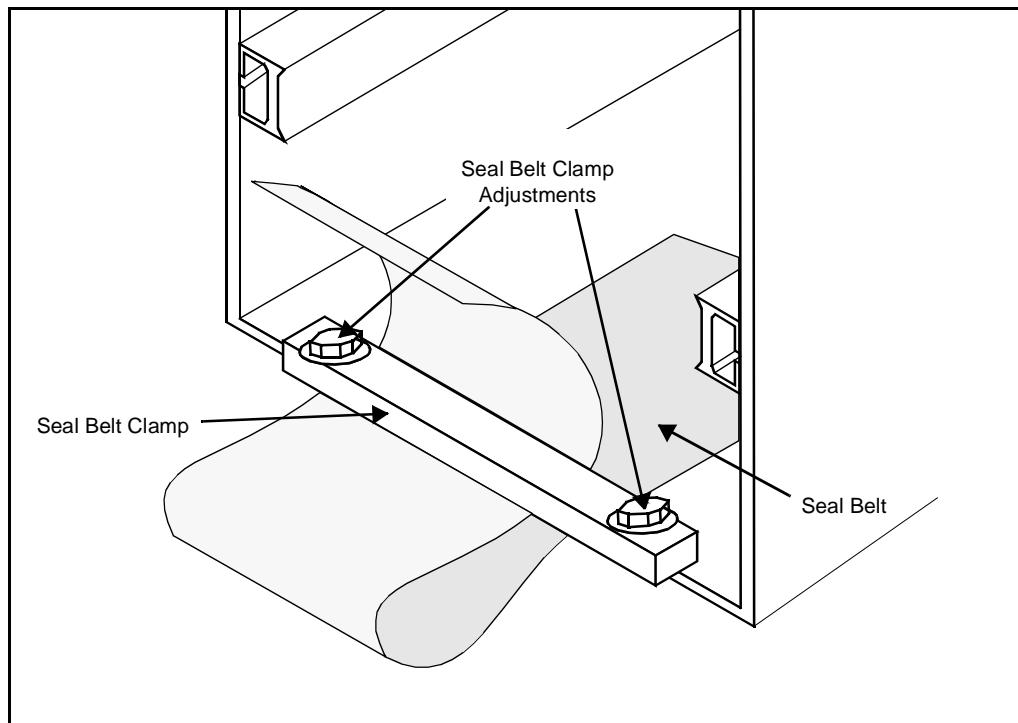
Figure 10-6 Seal Belt Clamp and Adjustment Bolts

2. Loosen the seal belt clamp at the Scanning Platform idler end.

3. Pull the seal belt through the Scanning Platform idler end.

4. Jog sensor heads to the Scanning Platform idler end.

5. Turn off power to the drive motor.

6. Thread the seal belt into position at the idler end under the seal belt roller and guide through the carriage assembly.

Note: It is extremely important to note that the seal belt should be centered between the extrusions otherwise the belt may rub the side of the extrusions while the sensor heads are scanning. This condition could result in unsteady scanning and premature wear of the seal belt.
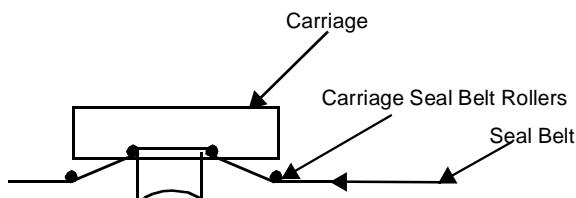
Figure 10-7 Seal Belt

7. Secure the belt at the drive end of the carriage with tape.

8. Turn on the power to the Scanning Platform long enough to jog the sensor heads to the drive end platform while maintaining enough tension to ensure that the seal belt does not contact the customer process.

9. Secure the belt at the drive end by threading through the seal belt clamp and tightening the clamp.

10. Pull the seal belt from the idler end of the platform to remove any slack in the seal belt.

11. Turn on power to the Scanning Platform long enough to jog the sensor heads to the idler end, carefully taking up slack in the seal belt.

12. Adjust tension such that the seal belt lays flat in the tray without any deflections in the seal belt roller assembly.
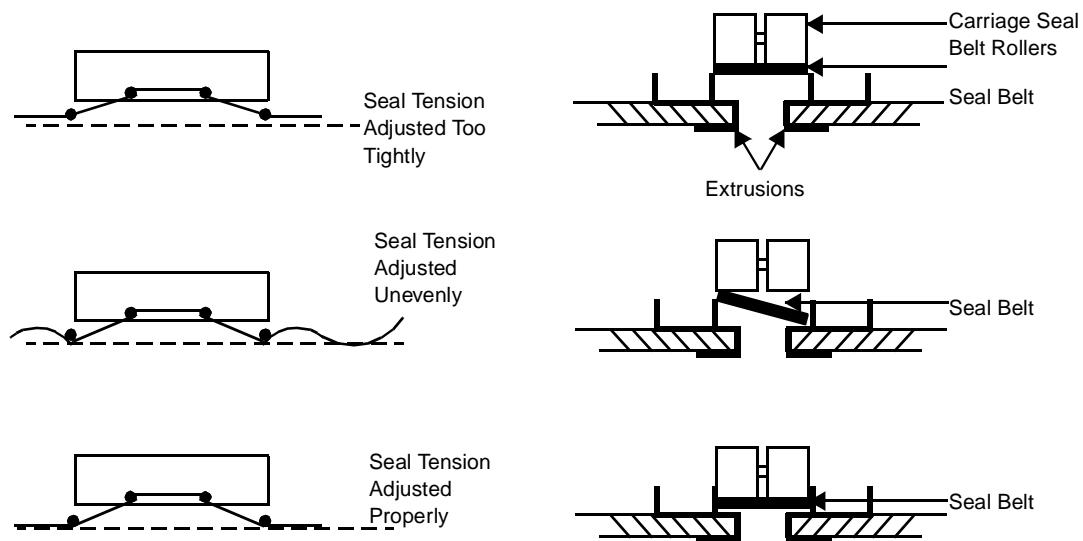
Figure 10-8 Seal Belt Tension Checks

Roller Assembly

Use the following procedure to replace roller assembly. See Figure 10-9 and Figure 10-8.
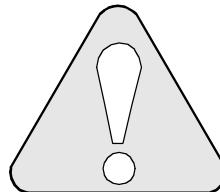
The Scanning Platform design allows replacement of this item while the customer's process is running. Exercise caution to ensure that the seal belt is kept clear of the process while being removed and replaced.

1. Jog the sensor heads to the end column that provides access to the roller that needs replaced.

2. Turn off the power to the drive motor.

3. Loosen the seal belt clamp and relieve tension from the split roller assembly. See Figure 10-6 on page 198.

4. Remove the bolt securing the damaged split roller assembly.

Figure 10-9 Roller Assembly

Drive Timing
Belt

Retaining
Bolt

Add thread–locking
compound In Threads
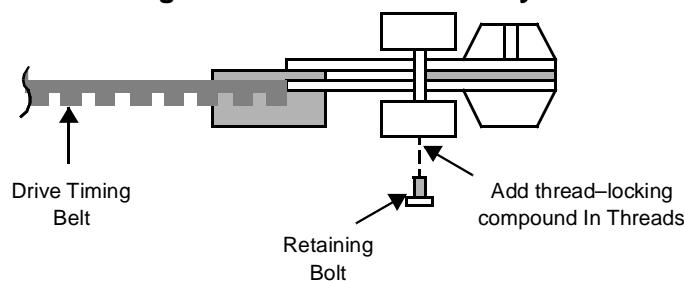
5. Remove the roller assembly.

6. Install the new roller assembly.

7. Add thread–locking compound to the threads of the bolt that secures the split roller. Reinstall it.

8. Pull the seal belt through the seal belt clamp to remove any slack in the seal belt.

9. Adjust tension such that the seal belt lays flat in the tray without any deflections in the seal belt roller assembly. See Figure 10-8.

Flex Cable Suspension

Complete the following steps to replace the cable suspension. Refer to Figure 10-10 and Figure 10-11.

Exercise care when working with toothed belt and toothed gear equipment. Do not wear ties or loose clothing while working near equipment.
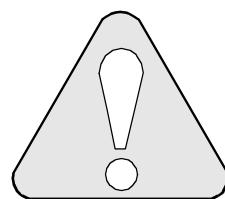
The Scanning Platform design allows replacement of this item while the customer's process is running. Exercise caution to ensure that the flex cable is kept clear of the process while being removed and replaced.

1. Put the platform in local mode and jog the head to the idler end column.

2. Pull out the carriage PC board, and disconnect the signal and power cable connectors. At the carriage end only, cut off the connectors from the signal and power cables.

Upper Assembly Top View
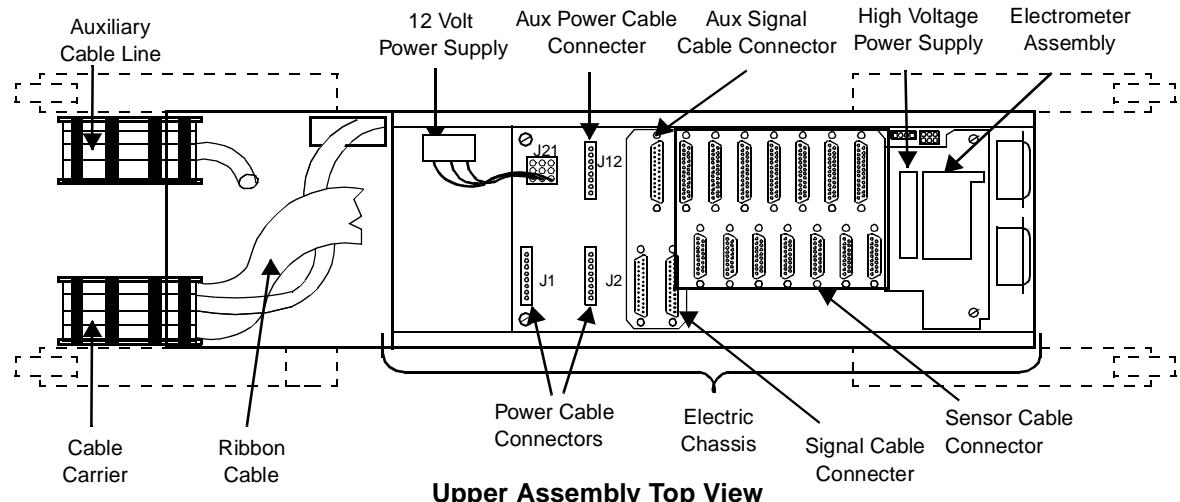
Figure 10-10 Carriage Assembly (Top View)

Note: It may become necessary to cut the utility lines on the manifold at the Scanning Platform idler end. The utility line is long enough to take up the slack. However, this should not be done too many times. Make sure the ribbon cable connectors are flat. This will make removal easier.

3. Disconnect the power and signal cables at the idler end column.

4. Jog the head to the drive end.

5. At the drive end, remove cable carrier mounting bracket.

6. Roll cable carrier back and pull power and signal cables from carriage.

7. At the idler end column, remove cable carrier retaining bolt.

8. Pull cable carrier out just enough so that it lays flat at the drive end.

9. At the drive end, with both cables out of the carriage, tape the old cable to the new cable using a high-strength tape. For example, use strapping or shipping tape. See Figure 10-11.
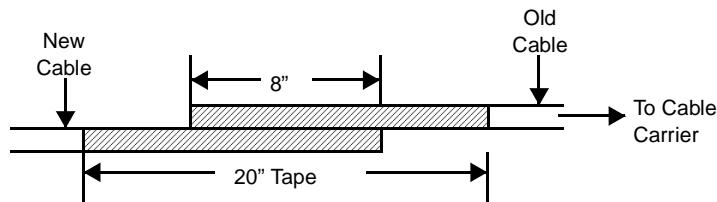

Figure 10-11 Cable Suspension

10. While one person at the drive end guides the new cable through the cable carrier, another person at the idler end column pulls the new cable through the platform. Once the cable is all the way through, leave enough excess cable at the idler end column to allow for a cable dress back into the idler end PC board.

Keep the cable carrier, ribbon cables, and utility lines clean. Dust and dirt will cause premature wear of the cables.

Note: Replacement of the complete assembly, ribbon cables, or utility lines can be accomplished at this time. If replacing the ribbon cable assembly, measure the length of cable exposed at each end and terminate new cable at the same length.

$$Flex\ Cable\ Length\ =\ center\text{-}to\text{-}center + 120\ in.$$

Equation 10-2   Flex Cable Length Equation

11. At the drive end, leave 60 inches of excess cable from the end of the cable carrier and cut the cable.

12. Terminate the signal cable according to Engineering Drawings 121974-003 and 121974-004.

Note: Do not reuse signal cable connectors. They must be replaced each time a new signal cable is installed.

13. Terminate power cable according to Engineering Drawings 121974-003, and 121974-004.

14. Feed cables back at the same time through the trough leading to the carriage and reinstall the cable carrier mounting bracket.

15. At the idler end column, reinstall the cable carrier retaining bolt and cut the new power cable to the length needed to dress into the end column PC board. Install the connector according to Engineering Drawings 121974-003 and 121974-004.

16. Reconnect the power and signal cables to the idler end column PC board.

17. Jog the head to the idler end column, pull out the carriage PC board and reconnect the power and signal cables.

18. Push the carriage PC board back into place.

Electric Chassis
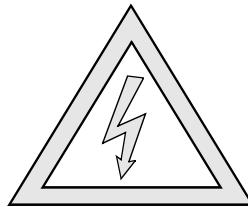
There have been several reported occurrences of the MP power flex cable being plugged in wrong. A typical error puts 120 VAC where the ± 15 VDC is supposed to be. If the system is powered up with the power cable plugged in wrong, catastrophic failure of sensors is likely.

Electric Chassis Replacement Procedure

Complete the following procedure to replace the electric chassis in the upper or lower carriage. Refer to Figure 10-12.

1. Jog sensor heads to the Scanning Platform idler end.

2. Turn Off power to the Scanning Platform.

3. Remove the carriage end cover, then pull out the electric chassis.

4. Remove the cable connectors for the sensor interconnection.

5. Remove the ribbon cable connectors for the cable suspension from the carriage electric chassis.

6. Replace ribbon cable connectors for the cable suspension.

7. Replace the cable connectors for the sensor interconnection.

8. Slide the replacement electric chassis in place.

9. Replace the carriage end cover.

10. Turn On power to the Scanning Platform.
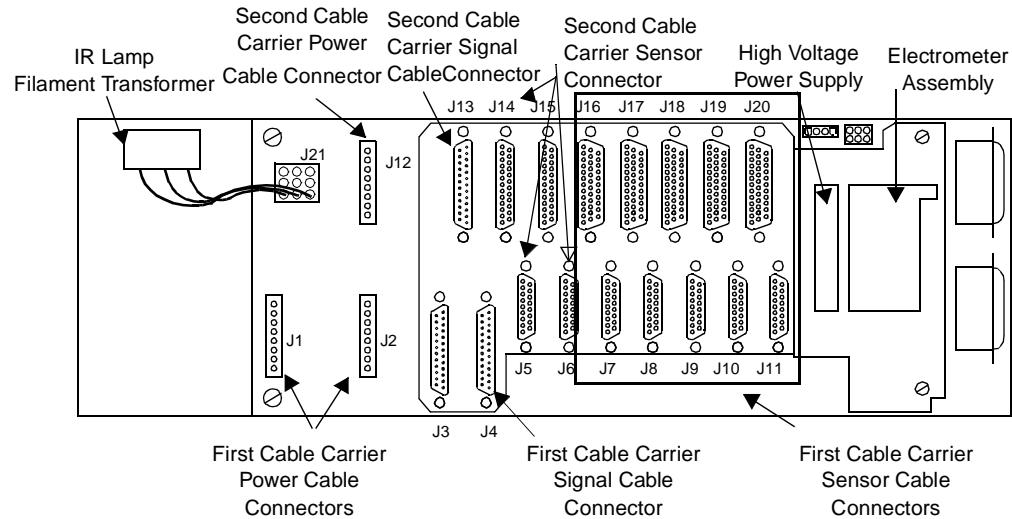
Upper Assembly Top View

NOTE: Static Box is not shown
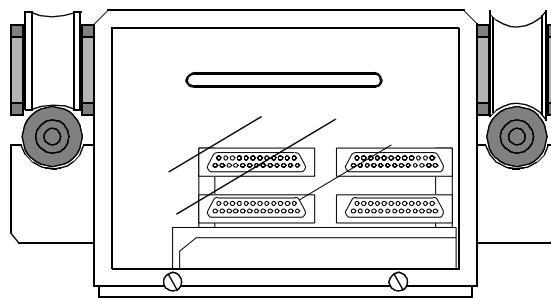
Idler End View
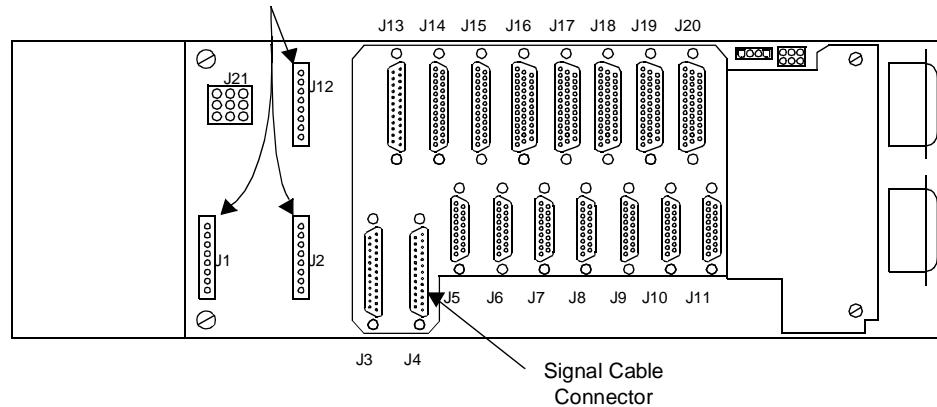
Lower Assembly Top View

Figure 10-12 Carriage Assembly

Flex Power Cable Retrofit Kit

The Flex Power Cable Retrofit Kit (Part Number GK-130618-001), significantly reduces the chance of plugging the power cable connectors in wrong.

The kit includes the following:

• Two 9-pin connectors (Part Number 101929-609)

• Two keying caps (Part Number 101929-901)

• Drawing Number DI-130618-000

One kit is enough to do one scanner (top and bottom) or two reflection scanners. The second flex cable (used for ash only) does not use two connectors so it does not need any rework.

Note: Changing the connectors will not prevent damage if the connectors are not installed on the cable correctly. The verification procedures on the instruction drawing are still required when replacing cables. However, once the cable is correctly made, use of this kit should prevent the connectors from being plugged in wrong.

Flex Cable Replacements

The correct procedure requires you to verify that the cables are correctly installed before repowering any sensors. There are two relatively simple ways to do this:

• After plugging the system back together, before repowering the frame, use two diagnostic cards and do continuity checks between the end column diagnostic plug and the carriage diagnostic plug.

• Unplug all of the sensor cables, electrometer, chamber supply, and IR transformer so you can power up the frame without danger of destroying your sensors. Check the supply voltages on the diagnostic plug (s) at the carriage before plugging anything back together. Again, refer to your test card inserts.

Doing both checks is recommended to make sure all of the wires are in the right place and there are not any catastrophic failures.

Figure 10-13 shows the proper cable dress in a SP1200. Note that the longer side of the power cable plugs into the back connector (towards the drive end of the carriage board). The short side of the power cable plugs into the front connector (closer to the idler end). That is done to help from the cable loop so you can slide the carriage board assembly out.
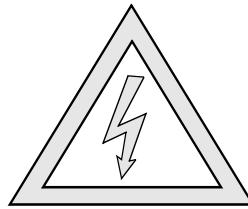
Unfortunately, when the carriage board is pulled all the
way out, the cable looks backwards if you forget about
that loop. If you do not remember the loop, and plug the
cable in the way it probably looks like you should, you
just did it wrong.
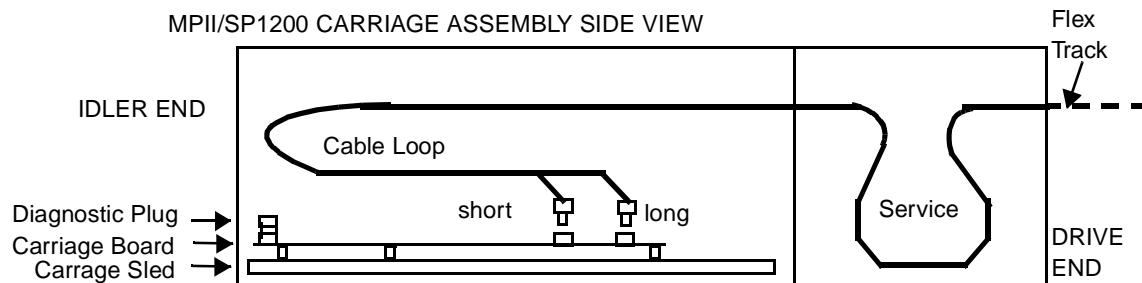
Figure 10-13 Side View of Proper Cable Dress for SP1200

Motor Drive Replacement (ABB ACS-100)

Complete the following procedure to replace the Motor Drive. The FINCOR and Lovejoy Motor Controllers are not available and must be replaced by the ABB ACS-100 Drive. See Figure 10-14.
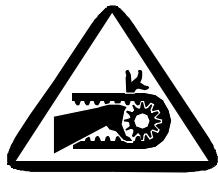
Exercise care when working with toothed belt and toothed gear equipment. Do not wear ties or loose clothing while working near equipment.

The ABB Motor Controller upgrade kits include specific instructions on the replacement procedures. If the SP1200 frame has the motor controller mounted in the Drive End Column, then the upgrade kit is 134137-003. If the motor controller is located in the Remote Junction Box, then the upgrade kit is 134137-001

1. Turn Off power to the Motor Drive sled.

2. Pull out the Motor Drive sled.

3. Disconnect the three cables from the Motor Drive sled.

4. Remove the old motor drive sled and replace with the new one.

5. Reconnect the cables to the Motor Drive sled.

6. Return Motor Drive sled to its position in the drive end column.

7. Turn On power to the controller and complete the Motor Controller Setup procedure.

Note: If the motor happens to run backwards, swap the wires in JDRV-1 and JDRV-3.

8. Execute the standard frame tuning procedure (ft) in the software.
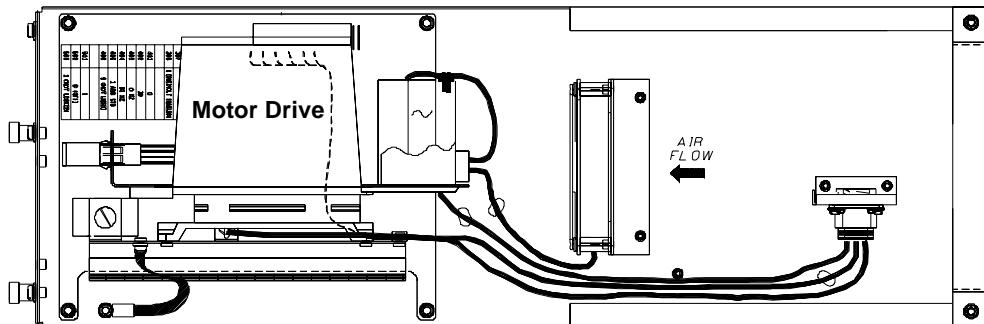
Figure 10-14 SP Motor Drive Assembly

Pressure Switch

Complete the following procedures to replace the pressure switch. Refer to Figure 10-15.

1. At the drive end, remove the bolt that holds the bracket on which the solenoid and pressure switch rest.

2. After the bracket has been removed, detach the two wires from the top of the the pressure switch.

3. Unscrew the pressure switch.

4. Install the new pressure switch and make the wiring connections.

5. Reattach the bracket to the drive end of the Scanning Platform.

Scanning Platform

Drive-side end column
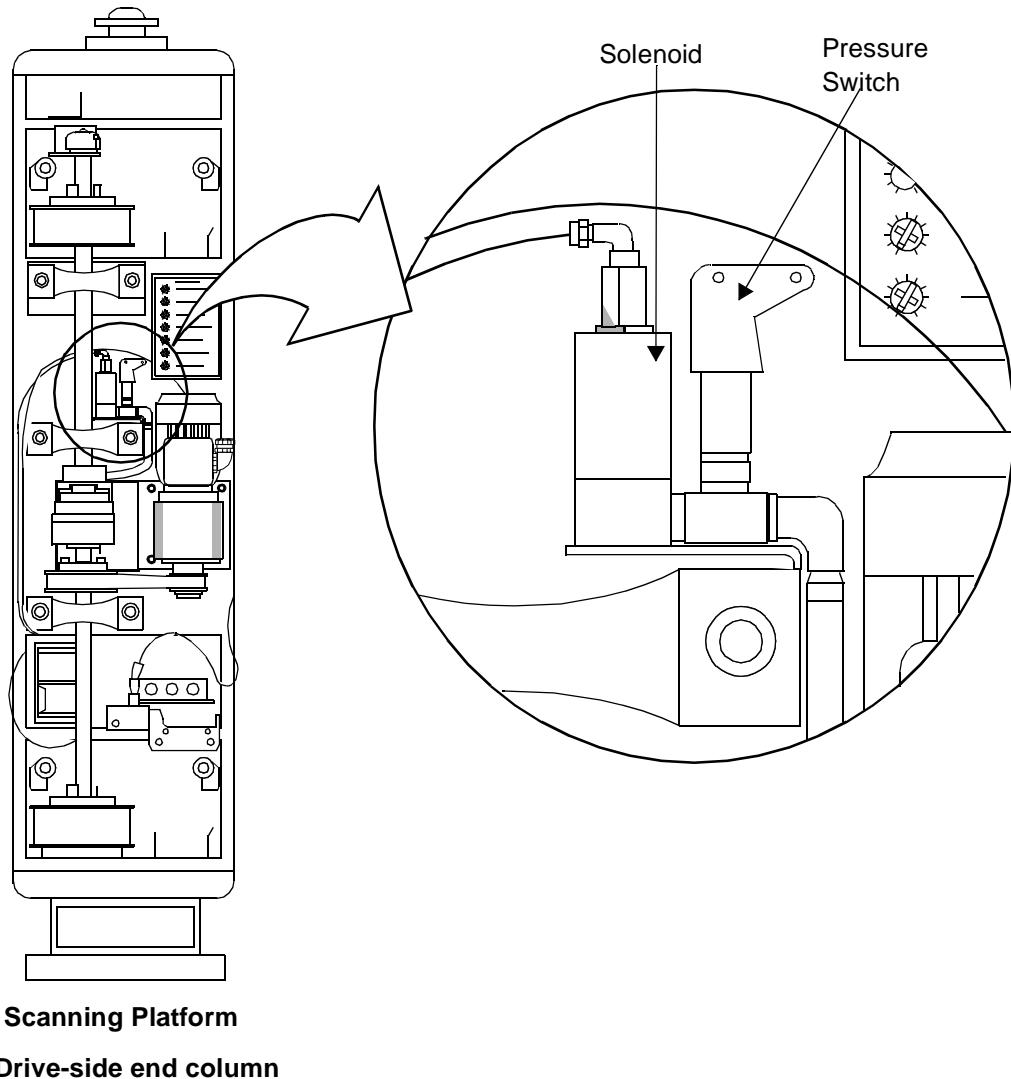
Figure 10-15 Pressure Switch

Encoder

Complete the following procedure to replace the Encoder. See .

1. Unplug the D connector from the encoder cable.

2. Remove the four screws which are holding the encoder to the metal plate.

    Lift the encoder from the plate.

Replacement Parts List

Refer to:

- Table 10-1
- Figure 10-16 on page 215

Table 10-1 Replacement Parts List

Key	SP Replacement Parts List	Part #
	END COLUMN, DRIVE-SIDE	
A	Encoder	019775-004
	Drive Motor Belt (54T)	015125-008
G	Pillow Block (3 req'd)	011756-106
B	Drive Pulley (2 req'd)	121849-001
	Key (4 required)	046102-013
	Ball Bearing Flange	011230-107
F [1]	Gear Motor, incl. reducer	100456-003
E	Pressure Switch (15 A)	SC0001-001
D	Air Solenoid Valve (1/8")	MW0018-001
	Clutch	121824-001
	Clutch Coupler	121808-001
	Upper Drive Shaft	121810-001
	Lower Drive Shaft	121811-001
	Lover Drive Shaft (Extended End Column)	121811-002
	MOTOR DRIVE	
	SP1200 Motor Drive Assembly including MDPanel and Filter	126620-005
	Motor Drive Subassembly (Remote Junction Box only)	133853-001
	Motor Drive Choke Assy. (Remote Junction Box only)	086277-001
	240 VAC Fan	102258-001
	DOOR HARDWARE	
	LH Hinge	100497-002
	RH Hinge	100497-001
	Latch, adjustable	100498-001
	SCANNING PLATFORM	
	Limit switches, std.	100524-001
	Adjustable limit switch kit	121994-002
	Seal Belt, polyester	100434-005
	CARRIAGE FRAME	
	Carriage Light Assy.	084910-001
	Cover, way adjuster	121966-001
	CARRIAGE, INTERNAL	

	Cable Carrier, Divided (1 meter sections)	100490-005
	Hose, Dual flat	101497-001
	Signal Cable, flat (for divided cable carrier)	101575-037
	Power Cable, flat flex	100983-003
	Signal Plug	101403-137
	Signal Receptacle	101403-037
	Stabilizer (37 pos)	101405-837
	Connector (37 Pos) Screw Retainer Kit	101403-901
	Cable Carrier, Undivided (1 meter sections)	100490-001
	Signal Cable, Flat, for undivided cable carrier	100577-037
	Drive Belt	100446-001
	Wheel assy.	121975-001
	Wheel assy., expansion	121975-002
	Upper Seal Belt Roller	121940-001
	Lower Seal Belt Roller	121961-001
	Carriage Connection board	085218-001
	END COLUMN, IDLER SIDE	
	Manifold	127202-003
	Pulley Bushing (2 required)	121832-001
	Idler Assembly (2 required)	122607-002

	CONTROL PANEL	
	Control Panel (Keypad)	100472-012
	Control Panel Interface Board (Serial)	086351-004
	PURGE BLOWER	
	High Capacity Purge Blower	101495-006
	Purge Blower Assembly without Cabinet and with High Capacity Purge Blower	123595-008

[1] Frame shipped after 10/01/93 use a 100456-003 motor. To upgrade, order kit 130532-002.

Detail - Drive Motor Mechanism
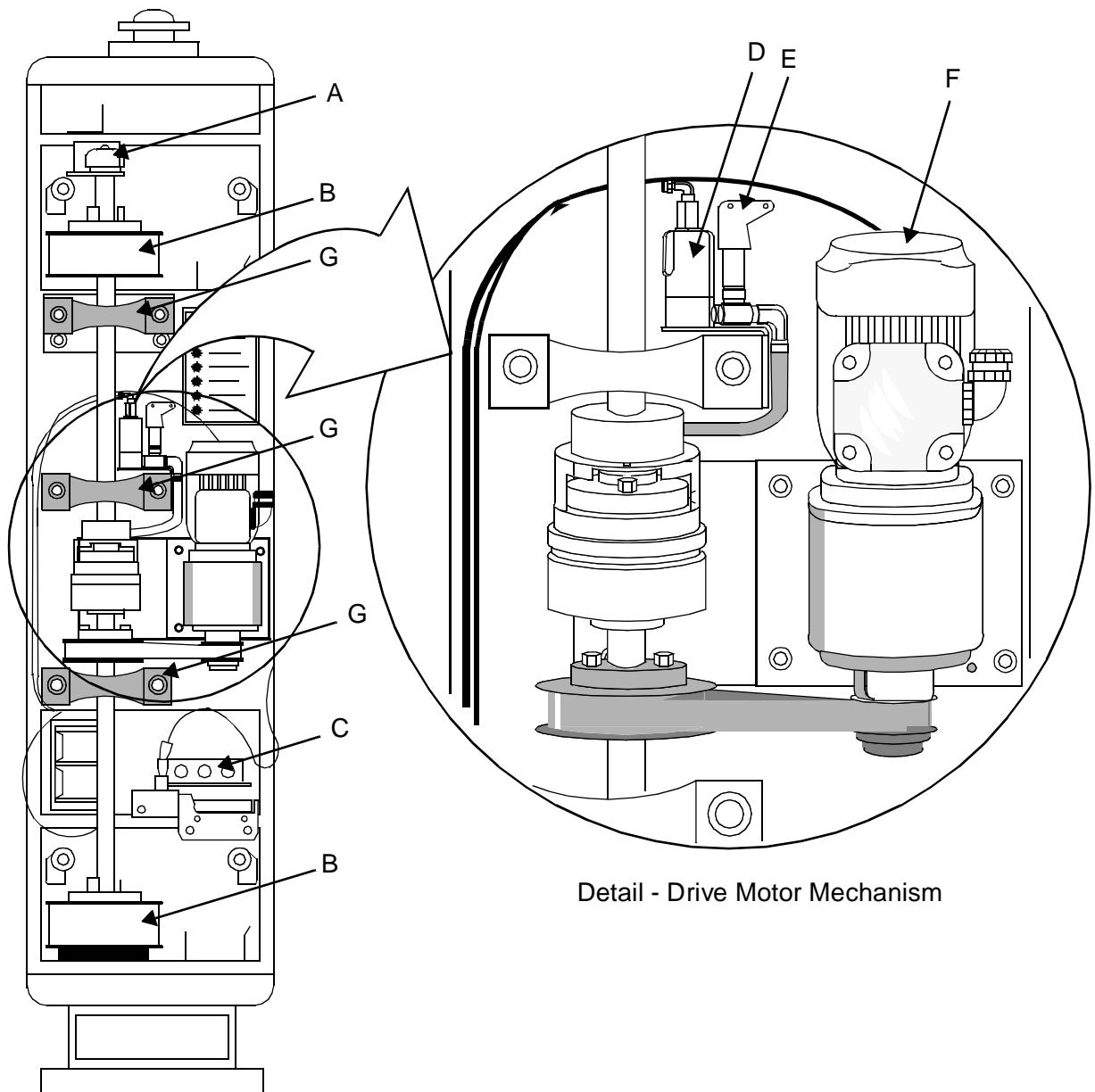
Figure 10-16 Drive End Column Parts

Replacement Parts for the ASPC

Refer to:

Table 10-2 Replacement Parts

Key Letters	Scanning Platform Electronics	Part Numbers	See Figure
A[2]	ECS Board	086329-104	
B	SMI (located on the ECF and ECS boards) (IR CoatWeight and Aseptic Only)	086339-101 086339-002	
C[2]	ECF	086348-001	
D[1 2]	MPRC	086349-102 or 086444-103	
E	BRAM (located on MPRC board)	086318-001	
F	ECPSR	086370-001	
G	Heat Exchanger	101376-001	
H	Fan, 24 VDC	128950-001	
I	OSPS2	086363-002	
J[3]	EC24V	086362-001	
K[4]	HAM	086369-001	
J1[3]	12 VDC Plug-on for EC24V	101554-912	
J2	Fuse, Plug-on for EC24V (3 amp) and HAM	101560-003	
M	AC to DC Converter, 300 VDC	101554-300	
K1[4]	48 VDC Plug-in for HAM	101554-148	
L	5 Amp Fuse	018252-008	
N	ECC	086387-001	

Note: 1. Part Number 086444-103 is a kit that includes the MPRC Board, instructions, and software upgrades required when replacing 086349-001 and -002 MPRC Boards with a 086444-003 MPRC Board.

2. The ECS, SMI, and MPRC Boards have daughter boards mounted on them. See Figure 10-19. These daughter boards must be ordered separately and are not supplied as part of the main board assemblies.

3. EC24V PWA (086361-001) does not include DC-DC converters. Order 101554-912 (Quantity 2 per board) separately.

4. HAM Board, part number 086369-001 does not include 48 VDC plug-in module. Order 101554-148 separately.
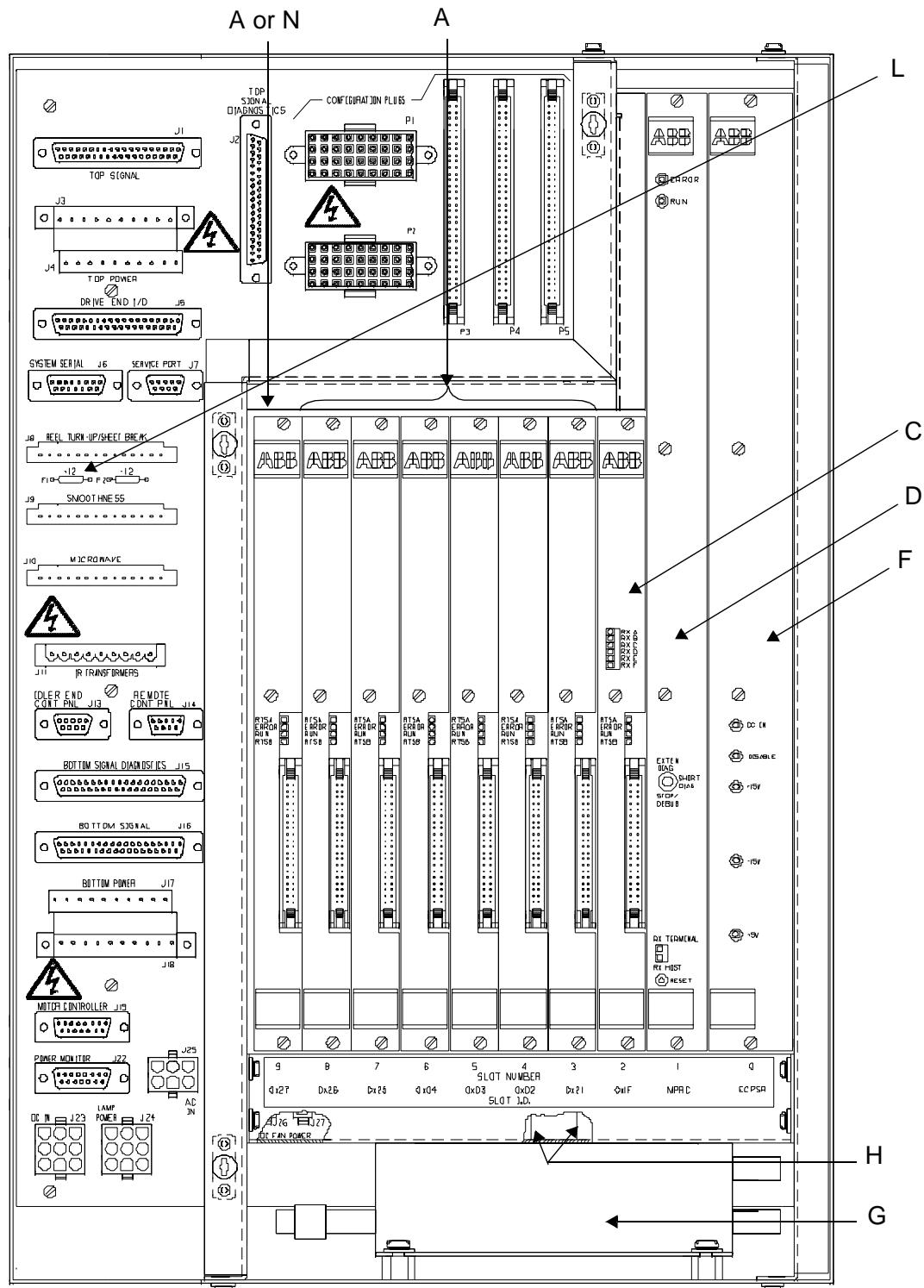
Figure 10-17 SP Electronics Cabinet (086345-004 Backplane Version)
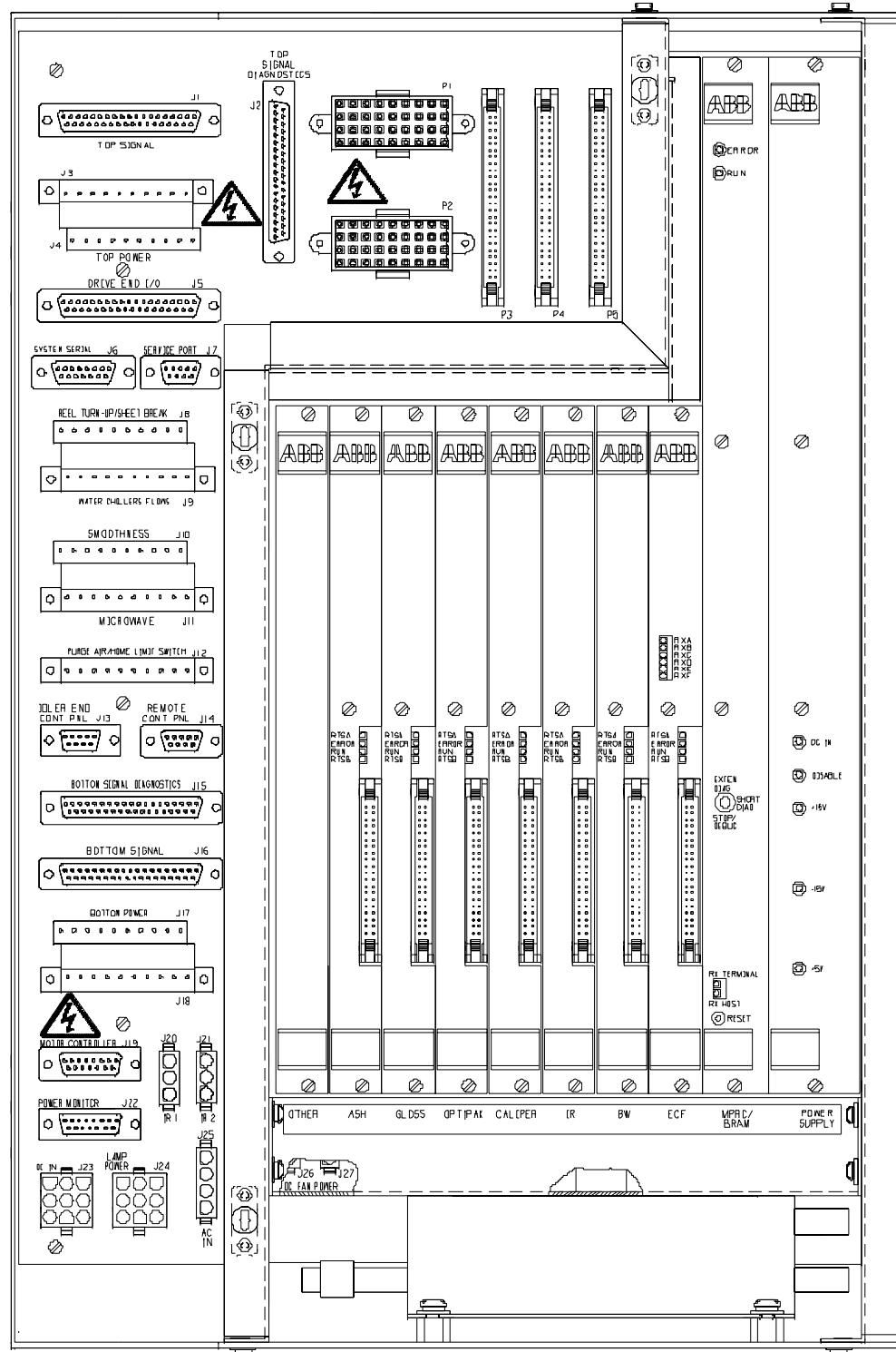
Figure 10-18 SP Electronics Cabinet (086345-003 Backplane Version)
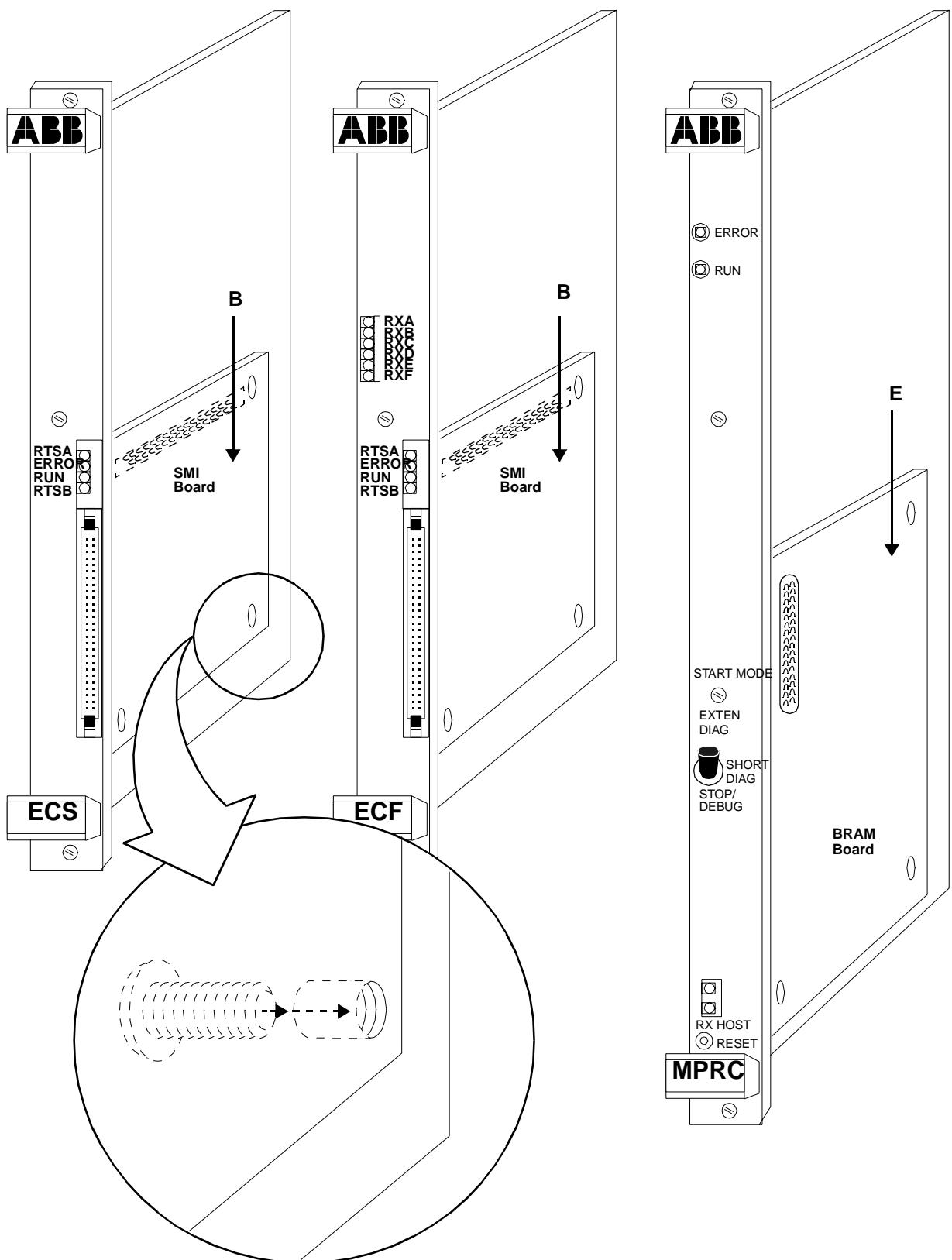
Figure 10-19 Location of SMI and BRAM Boards

OPTIPAK
GLOSS 1
GLOSS 2
Lights

DISABLE
DC IN
Lights

I   J, J1, J2

K, K1, J2

M

Side View

+12V OUT
-12V OUT
Lights

Idler End
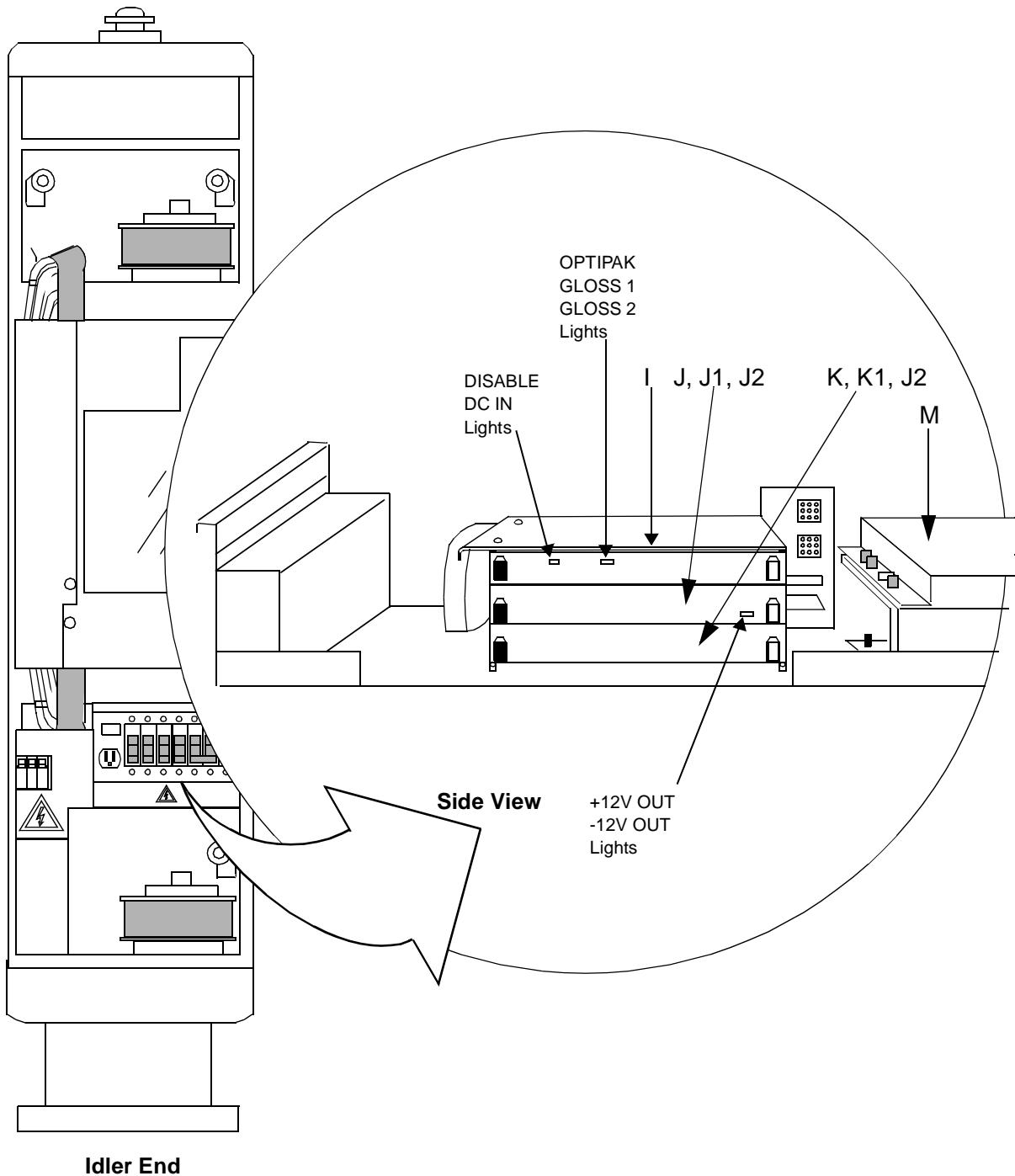
Figure 10-20 Location of OSPS2 and EC24V

Replacement Procedures

11

Troubleshooting

This chapter describes basic troubleshooting that can be done using the LED in the Scanning Platform electronics cabinet and through console messages that are displayed at startup.

This chapter contains the following major sections:

Alarm Messages

Alarm messages are associated with each of the Service Workstation Health Reports. For a DOS environment Service Workstation, the alarm messages below may appear on the Report pages for Electronics Health and Frame Health. For NT Service Workstation environments, these alarms will appear as a part of the Frame Health Report (Alarms tab, then Electronics or Frame tab). Alarms from other health reports are explained in manuals describing operation and maintenance for those features.

Messages which appear in the 'pe' log are not explained here. These appear only in manuals targeted for advanced troubleshooting.

Note: Most actions suggested below assume the hardware path leading back into the software is functioning. This includes the ECF board, the SMI daughter board, and the MPRC board. These are also candidates for replacement during any troubleshooting.

Electronics Alarm Messages

End Column Power Temp Out of Limits

The temperature of the power supply converter board, located in the end column card cage, has exceeded the maintenance limit of 50 °C. If it reaches 65 °C, the Scanning Platform will power down.

A Board Temperature is Out of Limits

The temperature of one of the microcontroller ECS boards or the MPRC board, located in the end column card cage, has exceeded the maintenance limit of 50 °C. If it reaches 65 °C, the Scanning Platform will power down. If the ECF is the one affected, then the limits are 59 °C and 69 °C.

Chiller Flow Out of Limits

The digital input indicating the state of flow (on/off) from the chiller flow unit is showing no flow. The chiller flow unit provides cooling for both the end column card cage as well as any IR Moisture sensor mounted on the scanner. If a second chiller unit does NOT exist, then the alarm for the second unit can be disabled by using the *dim* utility to invert the input bit.

Voltage Level Out of Limits

Various board voltages on each microcontroller are derived from the + and - 15 volt power supply board voltages. The range of each voltage is as follows:

	low	high
AnalogPosVolt01_ai	14.6	15.4 *
AnalogNegVolt01_ai	-15.4	-14.6 *
DigitalVolt01_ai (ECF)	4.9	5.1 *
ThermRefVolt01_ai	4.44	4.56
A2DRefVolt01_ai	4.45	4.55
A2D Test Volts (ECF)	4.85	5.15 **

 * Voltage is derived from the ECPSR power supply board.
 ** A feedback test signal from the ECF A2D converter.

Communications Loss For Frame ECF/*xxxx* ECS

HDLC communication to the specified sensor/frame ECS/ECF board has been lost. Usually a reconnect results in recovery without any loss of performance. If multiple microcontrollers are disconnected, it could mean a defective MPRC board. Persistent disconnects of a single board may mean that the board is defective.

There are two HDLC comm lines used. The assignments are as follows:
 LINE 1 - ECF, Basis Weight, Gloss, Ash
 LINE 2 - IR Moisture, Caliper, OptiPak, General/Color

Undefined Alarm

Some alarm condition has occurred for which there is no display text. Note the associated code and call the Support Line for assistance.

Frame Alarm Messages

Motor Stopped by Obstacle

There has been no detected motion along the current trajectory causing an excessive position error. Possible areas of investigation are the motor controller, a mechanical failure of the drive train, incorrect setup of the motor controller, or vminTune turned off with activeVmin set too low.

Head Position Verify Test - Timeout

The 'Self Test' push button on the Frame Control Panel has been pushed with the frame in LOCAL (hand) and the sequence of resynchronizing and positioning to off-sheet has not been able to complete. Check for defective motor controller, encoder, ECF board, and home limit switch. The red LED on the panel push button should be flashing.

Head Position Verify Outside Limits

The 'Self Test' results are not within acceptable limits. The resultant off-sheet position reached was not within 20 encoder counts of the original position. The red LED on the push button will remain flashing. Possible problem with the encoder slipping, or a bad ECF board.

Head Resynchronize - Timeout

Encoder synchronization has failed to take place after being initiated. Could be a problem with the encoder or ECF board.

Head Speed Inconsistency

Caused when the system response to the servo commands results in one of the following three conditions: (1) vmin tuning has been aborted, (2) there is an excessive ddc error, or (3) the servo has timed out. First check for a mistuned servo setup, including the motor controller itself. Could also have hardware problems with MPRC and ECF boards.

Beam Air Flow Off

There currently is no air flow switch monitoring the beam air flow. If this alarm appears, it means that the bit in the ECF board is being seen as set. Correct by using the *dim* utility to invert the bit.

Power Shelf Temperature Out of Limits

The temperature of the power supply shelf has exceeded the maintenance limit of 50 °C. If it reaches 65 °C, the SP will power down.

Motor Controller Temp Out of Limits

Temperature feedback from the motor controller assembly has exceeded the maintenance limit of 50 °C. If it reaches 65 °C, the SP will power down.

AI Slope and Offset Calc Failed

Failure of the ECF board to set up properly for processing the head position signal. Could be a bad ECF board.

Undefined Alarm

Some alarm condition has occurred for which there is no display text. Note the associated code and call the Support Line for assistance.

LED Interpretation

Basic troubleshooting that can be done using the LEDs in the Scanning Platform electronics cabinet.

Power Supply LEDs

The power supply is in the Scanning Platform electronics cabinet. Use the following table to troubleshoot the Scanning Platform electronics. See Table 11-1 and Figure 10-17 on page 218.

Table 11-1 ECPSR LEDs

LEDs	DESCRIPTION
DC IN on ECPSR	This LED refers to the 24 VDC power supply for the Scanning Platform electronics cabinet. When this LED is lit, the power supply is on, but may not be within acceptable tolerance.
DISABLE	This LED refers to the 24 VDC power supply for the Scanning Platform Electronics cabinet. When this LED is lit, 24 volts is not within acceptable tolerance and the +5V and ± 15V power supply has been shut down.
+15 V -15 V +5 V	These LEDs refer to the presence of their respective voltages within the Scanning Platform electronics cabinet. When these LEDs are lit, the respective voltages are within acceptable tolerances.

ECF and ECS LEDs

These LEDs are located on the ECF and ECS boards in the Scanning Platform electronics cabinet. Use the following table to assist you in troubleshooting. Refer to Table 11-2 and Figure 10-17 on page 218.

Table 11-2 ECF/ECS LED Interpretation

LEDs	DESCRIPTION
RTSA (green)	The LED flashes when HDLC Port A has set its request to send and is attempting to transmit data. The intensity of the flashing depends on how much data is being transmitted.
ERROR (red)	This LED indicates status of local diagnostics; it is under software control on a reset. If the LED stays on after reset, replace the SMI. If the LED is flashing check the service console. If the LED is off and the RUN light is flashing, conditions are normal. If there are no LEDs lit, check to make certain there is power to the board.
RUN (green)	This LED is driven by the data strobe and indicates the level of 68332 external bus activity. The intensity of the LED varies from dim to bright depending upon bus activity.
RTSB (green)	This LED is not currently being used and should be off.

MPRC LEDs

These LEDs are located on the MPRC board in the Scanning Platform electronics
cabinet. Use the following table to assist you in troubleshooting. Refer to
Table 11-3 and Figure 10-18 on page 219.

Table 11-3 MPRC 086349-002 LED Interpretation

LEDs	DESCRIPTION
ERROR (red)	This LED indicates status of local diagnostics; it is under software control on a reset. If the LED stays on after reset, replace the SMI. If the LED is flashing, check the service console. If the LED is off and the RUN light is flashing, conditions are normal. If there are no LEDs lit, check to make certain there is power to the board.
RUN (green)	This LED is driven by the data strobe and indicates the level of 68332 external bus activity. The intensity of the LED varies from dim to bright depending upon bus activity.
RX TERMINAL	When the LED is lit (flashing), there is a physical connection to the terminal. When the LED is not lit (flashing), the physical connection to the terminal is broken.
RX HOST	When the LED is lit (flashing), there is a physical connection to the terminal. When the LED is not lit (flashing), the physical connection to the terminal is broken.

Table 11-4 MPRC 086444-xxx LED Interpretation

LEDs	Description
ERROR (red)	This LED indicates status of local diagnostics; it is under software control on a reset.
	If the LED stays on after reset, replace the MPRC.
	If the LED is flashing, check the service console.
	If the LED is off and the RUN light is flashing, conditions are normal.
	If the LEDs are not lit, check to make certain there is power to the board.
RUN (green)	This LED is driven by "Transfer in Progress" and indicates the level of 68040 external bus activity.
	The intensity of the LED varies from dim to bright depending upon bus activity.
NET TX_B (green)	When lit, the Ethernet port on J2 (Port B) is transmitting data.
NET TX_A (green)	When lit, the Ethernet port on the ASPC Host Connector (Port A) is transmitting data.
RTS 0 (green)	HDLC Port 0 is transmitting to the sensor microcontrollers.
RTS 1 (green)	When lit, HDLC Port 1 is transmitting to the sensor microcontrollers.
RTS 2 (green)	When lit, HDLC Port 2 is transmitting (unused in Scanning Platform).
RTS 3 (green)	When lit, HDLC Port 3 is transmitting (unused in Scanning Platform).
RX TERMINAL (green)	When the LED is lit or flashing, there is a physical connection to the terminal.
	When the LED is not lit, the physical connection to the terminal is broken.
RX HOST (green)	When the LED is lit or flashing, there is a physical connection to the host.
	When the LED is not lit, the physical connection to the host is broken.

Power Down and DC Power Analysis

If the system resets because of a power down condition, the cause can be determined by printing out an array of temperature and DC power data through a shell script. The temperature values within the system are monitored and checked against safety limits. When a safety limit is violated, the system will issue an alarm message and record, in a buffer, the current values of all of the temperatures. When the power down limit is exceeded, the temperature data is again read into the buffer. This buffer is stored in the **/ss01** BRAM disk area so that it is available at the next startup. Upon startup, the file is read in, where it is available for display using the shell script command. While several variables may have exceeded their safety alarm limit, the file shows the snapshot of the data at the moment the first power down event occurs.

Figure 11-1 on page 232 shows the subsystem temperature report. The information in italics is not printed, but is shown here to help decipher the somewhat cryptic labels.

Table 11-5 shows the associated alarm limits for each of the variables.

Table 11-5 Alarm Limits for Each Variable

Temperature Categories	Safety limit (°C)	Power Down (°C)
All board and platform temperatures	50	65
Basis Weight Temperatures with gap	100	125
Basis Weight Temperatures without gap	130	148
Ash Temperatures with gap	100	125
Ash Temperatures without gap	90	125
Caliper Temperatures	130	148

Figure 11-2 on page 233 shows the historical trend of each microcontroller's DC voltages. It is a rotating buffer of the last 20 updates. A snapshot update of all the DC power on the board is made each time a new high or low value for any of the DC levels is detected. This check is made every minute. This data can be viewed periodically by executing the shell script. Reviewing this data is useful in determining trends in power supply drift.

To print out both reports, at the AVOS shell ($$ prompt), type:

.D/ss01/clm/pwrdninf

The system displays, on the screen and printer (if available), the Power Down report including the microcontroller temperature and the DC power history for each microcontroller in the system.

```
UCONTROLLER SUBSYSTEM TEMPERATURES: 12-21-1991  12:57:14
```

brdTemp[0]:	33.90	*(frame)*
brdTemp[1]:	28.99	*(Basis Weight)*
brdTemp[2]:	29.55	*(IRMoisture)*
brdTemp[3]:	0.00	*(Caliper)*
brdTemp[4]:	30.15	*(OptiPak)*
brdTemp[5]:	0.00	*(Gloss)*
brdTemp[6]:	30.75	*(Ash)*
brdTemp[7]:	35.87	*(General)*
ecespTemp:	5.00	*(End Column Temperature)*
beamAirFlowAlm:(BOOL)1 ALARM		
chillFlowAlmA:(BOOL)1 ALARM		
chillFlowAlmB:(BOOL)1 ALARM		
spare:(BOOL)0 UNUSED		
ash_sct	0.00	*(with gap source CAP temperature)*
ash_dct	0.00	*(with gap detector CAP temperature)*
ash_sht	44.52	*(without gap head CAP temperature)*
beta_sct	0.00	*(with gap source CAP temperature)*
beta_dct	0.00	*(with gap detector CAP temperature)*
beta_sgt	53.91	*(without gap source gap temperature)*
beta_dgt	53.87	*(without gap detector CAP temperature)*
beta_sht	54.90	*(without gap source column temperature)*
beta_dht	55.81	*(without gap detector column temperature)*
caliper_probtemp:	0.00	

(Text in italics is shown for clarification and does not appear on the actual report.)

Figure 11-1 Subsystem Temperature Report

Date	Temp	Vapos	Vaneg	Vref	Vtref	Vdig
12-12-1991 11:19:56	33.90	15.10	-14.96	5.00	5.00	5.00
12-12-1991 11:20:58	33.40	15.10	-14.96	5.00	5.00	5.00
12-12-1991 11:25:01	33.90	15.02	-14.96	5.00	5.00	5.00
12-12-1991 11:28:03	33.90	15.10	-14.96	5.00	5.00	5.00
12-12-1991 11:36:07	33.90	15.10	-14.92	5.00	5.00	5.00
12-12-1991 11:52:13	33.40	15.10	-14.96	5.00	5.00	4.96
12-12-1991 13:56:14	32.90	15.10	-14.96	5.00	5.00	5.00
12-12-1991 14:32:40	33.40	15.10	-14.96	5.00	5.00	5.04
12-12-1991 14:40:48	33.40	15.10	-14.96	5.00	5.04	5.00
12-12-1991 16:31:46	33.40	15.10	-14.96	4.96	4.96	5.00
12-13-1991 08:31:33	32.90	15.10	-14.96	5.00	5.00	5.00
12-13-1991 08:32:35	33.40	15.10	-14.96	5.00	5.00	5.00
12-13-1991 08:34:38	33.40	15.10	-14.96	5.00	4.96	5.00
12-13-1991 08:35:39	33.40	15.10	-14.92	5.00	5.00	5.00
12-13-1991 08:36:40	33.40	15.02	-14.92	5.00	5.00	5.00
12-13-1991 08:45:47	33.40	15.10	-14.96	5.00	5.00	4.96
12-13-1991 08:47:49	33.90	15.10	-14.96	5.00	5.00	4.96
12-13-1991 09:20:07	33.40	15.02	-14.96	5.00	4.92	5.00
12-13-1991 10:06:07	33.40	15.10	-14.96	4.96	5.00	5.00
12-13-1991 11:02:43	33.90	15.10	-14.96	5.00	5.04	

Figure 11-2 Historical Trend Report for Microcontroller DC Voltages

Note the following definitions for Figure 11-2:

V_{ref} -   is the A to D signal

V_{tref} -   is the thermistor reference

V_{dig} -   is the logic signal for the ECF board only

Diagnostic Card Operation

The Scanning Platform diagnostic card (See "Diagnostic Cards" on page 237.) slides into a plug-in unit that provides a source for easy checks for voltages and signals. The Smart Processing Center and the Sensor Electrical Interconnect board (SEI) have diagnostic connectors with which the plug-in unit connects.

Figure 11-3 Test Board Hookup

Diagnostics Performed at the Sensor

Reference Figure 11-4 and Figure 11-5.

The Sensor Electrical Interconnect board (SEI) is a printed circuit board used in basis weight and ash source and detector modules. The SEI distributes signals and power to the proper connectors. It contains the sensor diagnostics plug which allows external access to internal signals for troubleshooting. Electrical ORUs have cables or plugs that interface to this board. The air solenoids, PTC module, and the CAP thermistor make connections to this board in the source module. The Gap sensor printed circuit board, ELHV board, PTC power and CAP thermistor all plug into this board in the detector module.

The diagnostic access port is the cover located in the sensor module housing allowing external access to the diagnostic connector located on the SEI. Head package sheet guides may have to be removed to gain access to this panel.

The sensor diagnostic plug is a 37-pin connector designed to accept the diagnostic tool typically used to troubleshoot Smart Platforms and Smart Processing Centers. This diagnostic access is important for STLK-11 and STLP-3 sensors since it is impossible to gain internal access to powered up assemblies. Side plate access to internal assemblies does not exist. Sensor power is automatically disconnected through the connector if internal access is required.

There are three Light Emitting Diodes (LEDs) on the SEI board. The LEDs indicate the shutter status, internal check sample and PTC heater assembly on the source module. On the detector module the status of the PTC heater assembly is indicated, the other two lights are not used. They can be viewed through acrylic windows at the end of the sensor housing. Removal of the sheet guides may be necessary for clear viewing of the LEDs.

Figure 11-4 Basis Weight Source Module

ELHV
Board

Electrical
Interconnect
Board

Diagnostic
LEDs

Diagnostic
Access Port

Diagnostic
Plug

Figure 11-5 Basis Weight Detector Module

Diagnostic Cards

The pictured diagnostic cards may not represent those for your system.

The Top Power card is to be used for diagnostics performed at the sensor only. Refer to .

1	POWER COMMON SYSTEM			
20	-12 VDC	IR 120 VAC	LO	19
2	HV TEST CARRIAGE ONLY		HI	37
21	+12 VDC SYSTEM	CALIPER PRESSURE	LO	36
22	RETURN	HEATED AIR WIPE	LO	35
	GLOSS LAMP			
23	POWER	120 VAC	HI	34
24	RETURN	ASH HEATER	LO	33
	OPTIPAK LAMP			
25	POWER	120 VAC	HI	32
28	–15 VDC	BW HEATER	LO	31
27	SIGNAL COMMON SYSTEM	CALIPER HEAD LIFT SOLENOID	LO	30
28	+15 VDC			
	SCANNING PLATFORM TOP POWER 086086-052, SIDE 1, REV A			

Figure 11-6 Sample Diagnostic Card: Top Power

The Bottom Power card is to be used for diagnostics performed at the sensor only. Refer to Figure 11-7.

1	POWER COMMON		
20	-12 VDC		19
	SYSTEM		37
21	+12 VDC	BW SHUTTER LO	36
22	SHUTTER	CALIPER HEATER/ VACUUM/PURGE LO	35
	ASH	120 VAC	
23	FLAG	120 VAC HI	34
24	RETURN	ASH HEATER LO	33
	GLOSS LAMP	120 VAC	
25	POWER	120 VAC HI	32
26	-15 VDC	BW HEATER LO	31
27	SIGNAL SYSTEM COMMON	HEATED AIR WIPE LO	30
28	+15 VDC		

SCANNING PLATFORM
BOTTOM POWER
086086-052, SIDE 2, REV A

Figure 11-7 Sample Diagnostic Card: Bottom Power

The Top Signal card is to be used for diagnostics performed both at the sensor and the ABB Smart Processing Center backplane. Refer to .

1	ASH (Purge)		
20	COMMON DIAGNOSTIC	IR LAMP SENSOR	19
2	BW (Purge)	GLOSS CLAMP	37
21	HI	OPTIPAK CLAMP	18
	BW		36
3	LO		17
22	HI		
	ASH	AUTO EDGE OFF	35
4	LO	OF SHEET ON	16
23	HI	ELECTROMETER ASH	34
	BRIGHTNESS	TEST/CLAMP BW	15
5	LO		
24	HI GAP ATC GAP	SHEET LO	33
6	LO SENSOR BW INTERLOCK	TEMPERATURE HI	14
25	HI	ASH THERMISTOR	32
	GLOSS		
7	LO	+4.5V BIAS	13
26		IR LO	31
8		LOGIC HI	12
27	HI CALIPER AIR		30
9	LO BEARING		11
28	CAP or ATC COLUMN BW		29
10	+4.5V BIAS THERMISTOR		
	SCANNING PLATFORM TOP SIGNAL 086086-051, SIDE 1, REV A		

Figure 11-8 Sample Diagnostic Card: Top Signal

The Bottom Signal card is to be used for diagnostics performed both at the sensor and the ABB Smart Processing Center backplane. Refer to Figure 11-9 and to Figure 11-10 for the Backplane diagnostic card.

Pin	Left Signal		Right Signal	Pin
1	ASH (Purge)			19
20	COMMON	DIAGNOSTIC		
2	BW (Purge)		GLOSS CLAMP	37
21	HI (–)	CALIPER PROXIMITER	OPTIPAK CLAMP	18
3	LO		ASH — SHUTTER SWITCH	36
22	HI	FORMATION	ASH — CURRENT MONITOR	17
4	LO		ASH — MONITOR COMMON	35
23	HI	OPACITY	ASH — X-RAY H.V. MONITOR	16
5	LO			34
24	INTERNAL CAP or ATC COLUMN	BW THERMISTOR		15
6	+4.5V BIAS		BW — ALARM GRID	33
25	HI	GLOSS	BW — SHUTTER SWITCH	14
7	LO		BW — INT. CHECK SAMPLE	32
26	HI	OPTIPAK VACUUM	IR — GAIN MONITOR	13
8	LO		IR — LO	31
27	HI	CALIPER VACUUM/ THERMISTOR	IR — SIGNAL HI	12
9	LO		IR — DECREASE GAIN	30
28	THERMISTOR	ASH	IR — GAIN +15V	11
10	+4.5V BIAS		IR — INCREASE GAIN	29

SCANNING PLATFORM
BOTTOM SIGNAL
086086-051, SIDE 2, REV A

Figure 11-9 Sample Diagnostic Card: Bottom Signal Sensor

Figure 11-10 Sample Diagnostic Card: Backplane Power

SCANNING PLATFORM BACKPLA7NE POWER 086086-053, SIDE 1, REV /

The Bottom Auxiliary Power card is to be used for diagnostics performed at the sensor only.

1	ASH +15V		
20	-12 VDC SYSTEM	ASH FILAMENT VOLTAGE	19
		RETURN	37
21	+12 VDC		36
22	ASH COMMON	ASH +28V	35
23	ASH -15V	120 VAC HI	34
24	LO ASH H.V. ADJUST	ASH +28V RETURN	33
25	WIPER	120 VAC HI	32
26	-15 VDC		31
27	SIGNAL COMMON SYSTEM		30
28	+15 VDC		

SCANNING PLATFORM
BOTTOM AUX POWER
(ASH WITH REMOTE J-BOX) ONLY
086086-053 SIDE 2, REV A

Figure 11-11 Sample Diagnostics Card: Bottom Auxiliary Power

The Detector Module card is to be used for diagnostics performed at the sensor only.

1	+12 VDC		
20		Purge Sensor Volts	19
2	-12 VDC (not used)	PTC Monitor (Switch)	37
21	ELHV PcBd °C/10	Chassis Ground	18
3	Chassis Ground	PTC Monitor (High)	36
22		CAP Thermistor Low	17
4	+15 VDC	Chassis Ground	35
23		CAP Thermistor High	16
5	-15 VDC	GAP Signal Low [2]	34
24			15
6	Signal Common	Gap Signal High [2]	33
25	Signal Common	ELHV Test (Test=Low)	14
7	Gap PcBd °C/10 [2]		32
26			13
8			31
27		Electrometer Low	12
9			30
28	Chamber HV/100	Electrometer High	11
10	Gap Oscillator [2]		29

(TOP) Detector Module, STLK11, STLP3, STLXR3

[2] STLK11 and STLP3 only

Figure 11-12 Sample Diagnostics Card: Detector Module

The Source Module card is to be used for diagnostics performed at the sensor only.

1	+12 VDC		
20	Alarm Grid, STLP3	Purge Sensor Volts	19
2	-12 VDC [2]	PTC Monitor (Switch)	37
21		Chassis Ground	18
3	Chassis Ground	PTC Monitor (High)	36
22		CAP Thermistor Low	17
4		Chassis Ground	35
23		CAP Thermistor High	16
5			34
24		NC Shutter Stat (Red)	15
6			33
25		NO Shutter Stat (Grn)	14
7		Filament Monitor [2]	32
26		Chk Samp Stat (Future)	13
8	Ctrl, Shutter	Monitor Common [2]	31
27	+5V Ref [2]		12
9	Ctrl, Int Chk Samp	Anode Curr. Mon. [2]	30
28			11
10		X-ray HV/1000 [2]	29
	(BOTTOM) Source Module, STLK11, STLP3, STLXR3 [2] STLXR3 only		

Figure 11-13 Sample Diagnostics Card: Source Module

A

Appendix A:
Service Workstation Activities

To modify the Scanning Platform performance you will use the Service Workstation. These are procedures you will need for maintenance of the Scanning Platform.

This chapter contains the following major sections:

Displaying Reports

The Service Workstation can be used to view Standardize, Check Sample and Calibrate Sample reports. These reports contain the same information sent to the Host computer system but the data is displayed differently.

Standardize Report

There are two report arrays associated with the Standardize results: *stdzResultsPending* and *stdzResults*. *stdzResultsPending* reports on the results of the last standardize whether the results are within limits or not. *stdzResults* reports the results of the last acceptable standardize.

The procedure for displaying these reports is as follows:

1. Access the ***inspect*** utility.

2. Type: ***betaSensor01->stdzResultsPending*** (for example)

    The system will report back the address of that report.

3. Type in the address of the report.

    The system will display the results of the last standardize. See Figure A-2.

```
I> betaSensor01->stdzResults
stdzResults:       0x307bb2                    (int *)
I> 0x307662
0x307bb2 (id)

0x307bb2:              "0X307bb2"        (STRUCT_PRIVATE)
ISA:                   BWStdzRslts       (STRUCT_SHARED *)
mySelf:                0x307bb2                    (long)
problemList            0x30d72                     (id)
tempCompFlag           0                 '\0'      (char)
zeroScaleInput         0.000338776                 (double)
zeroScaleInputSigma    7.21414e-09                 (double)
lastCleanStdz:         0x307bd0                    (char [20])
dirt:                  0                           (double)
fullScaleTempRef:      55.0098                     (double)
fullScaleTempSigma:    1.2531e-09                  (double)
logRangeClean:         1.45815                     (double)
logVoltageRange:       1.45815                     (double)
voltageRange           4.29802                     (double)
voltageSigma:          3.70175e-05                 (double)
tClean                 0                           (long)
sourceTemperature      54.8                        (double)
detectorTemperature    55.06                       (double)
sourcePurge            3.70309                     (double)
detectorPurge          3.41578                     (double)
```

Figure A-2 Example of Standardize Report

To view the results of the last acceptable standardize, type in the variable: *stdzResults*. When there are no standardize failures, the address of the *stdzResults* and *stdzResultsPending* will be the same. The system will respond with the address of that report. Type in the address and the system will display the report.

If you want to know when the last clean standardize occurred, type in the address of the *lastCleanStdz* and the system will display the date and time of the last clean standardize.

Sample Check Report

The procedure for displaying the Sample Check report is as follows:

1. Access the *inspect* utility.

2. Type: ***betaSensor01->checkSampleResults*** (example for basis weight)

   The system will report back the address of that report.

3. Type in the address of the report.

   The system will display the results of the last sample check. See Figure A-3.

```
|-----------------------------------------------------------------------|
| I> betaSensor01->checkSampleResults                                   |
| checkSampleResults: 0x30842a               (int *)                    |
| I> 0x30842a                                                           |
| 0x30842a          (id)                                                |
|                                                                       |
| 0x30842a:             "0x30842a"              (struct_PRIVATE)        |
| isa:                  BWChkSmRslt             (struct_SHARED *)        |
| mySelf:               0x30842a                   (long)               |
| problemList:          0x30848a                   (id)                 |
| name:                 0x26b182                   (id)                 |
| transPPT:             1000.46                     (double)            |
| mylarWt:              -0.0277454                  (double)            |
| slope:                1                           (double)            |
| offset:               0                           (double)            |
| tempCompFlag:         0                '\0'       (char)              |
| tempComp:             0.80165                     (double)            |
| wtTempComp:           0                           (double)            |
| processBW:            -0.0277454                  (double)            |
|-----------------------------------------------------------------------|
```

Figure A-3 Example of Sample Check Report

Calibrate Sample Report

The procedure for displaying the Calibrate Sample report is as follows:

1. Access the *inspect* utility.

2. Type: ***betaSensor01->calibrateSampleResults*** (example for basis weight)

   The system will report back the address of that report.

3. Type in the address of the report.

   The system will display the results of the last Calibrate Sample. See Figure A-4.

```
|----------------------------------------------------------------------|
|I> betaSensor01->calibrateSampleResults                               |
| calibrateSampleResults:   0x312c7a                                   |
|I> 0x312c7a                                                           |
|  0x312c7a  (id)                                                      |
|                                                                      |
| 0x312c7a:          "0x312c7a"            (struct_PRIVATE)            |
| isa:               BWCalSmRslt           (struct_SHARED *)           |
| mySelf:            0x312c7a              (long)                      |
| problemList:       0x308b22             (id)                        |
| name:              0x26b182             (id)                        |
| headPosition:      64                    (double)                   |
| transPPT:          602.285               (double)                   |
| mylarWt:           29.3038               (double)                   |
| slope:             1                     (double)                   |
| offset:            0                     (double)                   |
| tempCompFlag:      0              '\0'   (char)                      |
| tempComp:          0.802075              (double)                   |
| wtTempComp:        0                     (double)                   |
| processBW:         29.3038               (double)                   |
|----------------------------------------------------------------------|
```

Figure A-4 Example of Calibrate Sample Report

Utilities

AVOS is the operating system for the Scanning Platform. The operating system controls the Scanning Platform's scanning, measurement processing and other computing resources. AVOS also supports a console interface between the Scanning Platform's computer hardware and technicians requiring access to the software for setup and troubleshooting.

This section will describe some of the important utilities and procedures required to interact with the Scanning Platform through the Service Workstation.

The inspect Utility

The *inspect* utility allows examination and modification of instance variables contained in the Scanning Platform software. To use the *inspect* utility, it is necessary to know two things: the name of the object where the variable resides, and the name of the variable.

The names of the objects which are accessible with the *inspect* utility are given in the **:global** printout. The names of the instance variables residing in any given object, can be listed by entering the object name while in the *inspect* utility.

The following procedure illustrates how to run the utility and perform some basic operations.

1. Place the desired Service Workstation in the *inspect* utility mode by typing *inspect* at the $$ prompt.

   The response is as follows if it is the first time *inspect* has been invoked since the last Scanning Platform restart or if class files need to be reloaded:

   inspect - @(#)inspect.c 1.1 - 88/10/05

   inspect:reading class files.

   I>

   During normal operation only the I> prompt will appear. The I> is the line prompt for the *inspect* utility.

2. Use the following format to enter the requested instance variable:

   To display an entire object list of instance variables:

   objectName

   To display a single instance variable and its value:

   objectName->instanceVariableName

   To change an instance variable's value:

   objectName->instanceVariableName=value

   To list all available object names:

   :global

Where:

objectName = the name of the software object containing the desired instance variable.

instanceVariableName = the instance variable name to be examined.

Value = the new number to be added. It must be in the same format as defined in the instance variable list.

3. For repeated display or value entry, simply enter a period (**.**) and press RETURN. The previously entered command will be repeated.

The gstore Utility

Modified coldstart instance variables must be stored in their respective **.ini** files located in BRAM.

Use the following procedure to store modified instance variables.

1. Make the desired value changes to the coldstart instance variables using the *inspect* or *genrpt* utilities.

2. Make a disk copy of all the existing **.ini** files in the **/clm** directory using the backup procedure.

   This puts each **.ini** file onto diskette where it can be retrieved if something goes wrong with the subsequent *gstore* command later in this procedure.

3. After all the changes have been made, write the information to the BRAM using the *gstore* utility in the AVOS shell at the $$ prompt:

   gstore

   The utility responds with a menu selection, see Figure A-5. Use Table A-1 to help make a selection. Answer all the interactive messages as required.

   When a selection has been made, the utility will offer the opportunity to overwrite the existing file, write to a new file, or quit without saving the file.

```
 $$ gstore

 Object Graph Storing Utility (imp200.002~)
 Selection    Object Graph    Head of Graph
 ~~~~~~~~~    ~~~~~~~~~~~~    ~~~~~~~~~~~~~
  1            frame           (scanner01)
  2            frameHI         (fhi01)
  3            io              (ucHardware)
  4            pmm             (pmmInterface)
 ENTER selection or q to quit:
```

Figure A-5 gstore Menu Screen

Table A-1 gstore Menu Item Descriptions

Selection	Object Graph	Head of Graph	Function (This section is not part of the actual menu)
1	frame	(scanner01)	All coldstart variables associated with the Scanning Platform scanning and sensors
2	frameHI	(fhi01)	All coldstart variables associated with the push button assignments on the Scanning Platform control panel
3	io	(VmeHardware)	All coldstart variables associated with the analog and digital I/O
4	pmm	pmmInterface	All coldstart variables associated with the Host interface objects

Note: Object Graph refers to the file_name.   Head of Graph refers to the object_name.

Identifying Sensor Configuration

To examine the current configuration of a scanner, follow the steps below.

1. At the $$ prompt type *inspect*.

2. At the I> prompt type:
   ( ) [scanner01 print] for the frame community
   or *( ) [pmmInterface01 print]* for the pmm community.

3. You will receive a printout. See the examples below.

The **Scanner01** printout contains the following information.

Example: scanner01 (Scanner1180M) : with AEOS
sheetBrkDet01 (SheetBrkDet)
Servo01 (Servo)
head01 (Head)
   Real Sensors:
     BetaSensor01 (BetaSensor):with ATC
     IRSensor01 (IRSensor) : Type HEMI+
   Derived Sensors:
     CondWtSensor01 (CondWtSensor)
   Sensors Not In Operation:
     (any sensors which are asleep)

The **pmmInterface0x** printout contains the following information.

Example: **pmmInterface (PmmInterface)**
pmmDriver (PmmDriver):
pmmFrames:
   pmmFrame01 (Pmm Frame)
pmmSensors:
   pmmBeta01 (Pmm Beta)
   pmmCondWt01 (pmmCondWt)
   pmmIRSensor01 (pmmIRSensor)

Determining Software Release Levels

The Scanning Platform software is controlled by a release level mechanism. This mechanism makes maintenance control and site software identification possible. Each major area of the system contains an image which reveals the release level of that component. The major areas are:

•   Application software

•   Microcontroller software

•   Lib01 library software

•   AVOS software

The following procedure will result in a report which identifies the release level of each major area.

1.   Type the following command while in the **AVOS ($$)** shell:

. /ss01/clm/revid

2.   The system will respond with a report. See the following example.

```
revision level of LIB01 libraries
/lib01/lib01rev:
   lib01_rev.c300.070Copyright 1993-1994 ABB Industrial Systems Inc.
revision level of the micro-controller software
      smi_id.c 140.0 04/26/95 (c) Copyright 1991-1994
what:  Cannot open /appl/smi/ecc.b
revision level of the application libraries
/appl/lib/p1_scan.lc:
      Scanner.m140.1
revision level of AVOS software

@(#)avos_rev.c 300.005
```

Preparing On–Site Documentation

Each time the Scanning Platform subsystem is restarted, it dynamically recreates the various objects and their linkages. As a result, the absolute address of any object and their associated instance variables can change from startup to startup. Therefore, access to the various instance variables and objects is primarily done through ASCII names and tokens. These are used as arguments to the utility commands which in turn gives access to the data in memory.

It is important to have available the lists of names and token numbers which are recognizable within the subsystem. This section identifies the activities which must be done to obtain these name and token lists. In some cases, the list should be printed out each time the system is upgraded. This will insure that certain address locations can be accessed for troubleshooting purposes in case of processor halts. See Table A-2.

Table A-2 Hardcopy Reports for On–Site Documentation

Report Name	Utility Command	Printout Frequency	Purpose
Sub-System Release Levels	*.D/ss01/clm/revid*	First startup	Gives a list of the release levels within the system
Module Map	*map -m*	Each upgrade	Provides the name, type, and stack size of each module in the order in which it was loaded
inspect Utility Object Names	*inspect* **:global**	First startup	Provides a list of module names which will be recognized by the **inspect** utility
Scanner and Sensor Instance Variable List	*inspect* *<each object>* (see partial list below) *scanner01* *betaSensor01* *IRSensor01* *caliperSensor01* *ashSensor01* *optipakSensor01* *pmmFrame01*	After calibration, tuning, and setup for each scanner and sensor has been completed or changed	Provides a complete list of the instance variables, their names and current values, as a record of setup and calibration activity

(Continued on next page)

Table A-2   (continued)

Report Name	Utility Command	Printout Frequency	Purpose
System Processor Run List	*dproc*	First startup	Gives a list of all of the processes that are running
I\O Configuration	*()[ucHardware printOnConsole]*	First startup	Provides a list of all of the analog and digital I/O and their channel assignments on one report

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